

QST

devoted entirely to
**amateur
radio**

February 1956
50 Cents
55c in Canada



PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE

**The features you want
are now EASY TO OWN**

Completely New
RME Electro-Voice
4300
RECEIVER



AMATEUR NET
\$194

Operator-Designed and Laboratory-Engineered for Amateur Communication

High Selectivity and Rejectivity

Precisely tunes the signals you want, even at high frequencies. Rejects unwanted signals and undesirable noise.

Easy Tuning and Smooth Operation

Unique two-speed control knob provides smoother, accurate tuning and scanning.

Mechanical and Thermal Stability

Highly stable components and construction prevent frequency shift or drift.

Structural Rigidity and Strength

Heavy steel chassis, cast aluminum panel and rugged steel cabinet assure stable, long-life service.

This completely new receiver includes many deluxe features usually found only in higher priced models. It is the only ham receiver, *regardless of cost*, providing injection control of the beat frequency oscillator. Particularly useful for CW and SSB reception.

Large, evenly graduated, illuminated dial covers all six amateur bands from 1.76 me to 29.8 me (160 thru 10 meters). Unique differential 75:1 or 1:1 ratio tuning control. Plates in tuning condensers are triple-spaced to reduce drift and microphonics. Selectivity control with four positions. IF curve is 2.8 kc wide without crystal filter, attenuation 60 db down at 7 kc above or below the desired frequency. Crystal filter has phasing control for variable rejection of unwanted adjacent signals. Excellent image rejection. High sensitivity of 2 microvolts for 10 db signal-to-noise ratio. Temperature-compensated. Drift is negligible after 20-minute warm-up. Extreme stability permits single sideband reception with or without adapter, ANL. Antenna trimmer permits peak adjustment. 4-position function switch. Two coaxial jacks for SSB adapter. 4-ohm speaker terminals. Transmitter relay control.

Controls include: Dual-speed tuning, AF gain, BFO pitch, BFO injection, antenna trimmer, calibration adjust, band selector, RF gain on-off, function switch, 3-position receive-standby-transmit switch, 4-position crystal selectivity control, crystal phasing-rejecter control, ANL. Size: 10 in. high, 16½ in. wide, 10 in. deep. Finished in attractive instrument-gray. 117 volts, 50-60 cycle AC.

To own the 4300 means more QSO's!

See your EV-RME distributor or write for Bulletin No. 240.

**MODEL 4301
SIDEBAND
DETECTOR-
SELECTOR**



New RME 4301 provides easy-to-tune, stable SSB reception of both carrier present and carrier suppressed types. Plugs directly into the RME Model 4300 receiver or easily connects between IF and audio stages in any other communications receiver. Built-in power supply. Size: 10 in. high, 8½ in. wide, 10 in. deep. Net \$75.00

Model 4302—Matching Speaker in enclosure. Net \$17.50

RME

RADIO MFG. ENGINEERS, INC.
DIVISION OF

Electro-Voice IN.
BUCHANAN, MICHIGA



W2CJO Supervises Final Testing of G-E Image Orthicons

Amateur background contributes to skill and knowledge needed for highly critical job

THE TV image seen by millions on tonight's hit program, will be clearer, more lifelike because Donald R. Roberts, W2CJO, helped assure top performance by G-E tubes in the studio cameras. Intricate to build, image orthicons get 16 final tests, visual and electrical. All are exacting.

Certain of these tests call for a knowledge of electronic principles as well as a mature understanding of camera-tube design and use. Here both Roberts and G.E. give credit to amateur experience as a source that provides background in practical electronics. "When I test image orthicons for microphonics," says Roberts, "the problem encountered is identical to one every ham

wrestles with—except that the eye, not the ear, is affected."

A ham license-holder since 1941, Roberts is active on 2 meters, both phone and CW. Interest in electronics led to his first Schenectady job, as studio and transmitter technician with WRGB, pioneering TV station. Here he gained television experience that further aids him in his present camera-tube assignment.

Radio amateurs like W2CJO are found throughout G.E.'s 7 tube plants, doing key work in the design, production, and testing of transmitting, industrial, and receiving tubes of all types. Your General Electric distributor supplies you with quality tubes to which amateurs have made a direct and important contribution! *Tube Department, General Electric Co., Schenectady 5, N. Y.*

GENERAL  **ELECTRIC**

166-181



Another Antarctic Expedition calls on **COLLINS** for communication

U.S. Navy Task Force 43 is establishing several bases in Antarctica in conjunction with the International Geophysical Year activities. Two bases will be built next year, one of them at the South Pole. The expedition, appropriately entitled "Operation Deepfreeze," is under the direction of Rear Admiral Richard E. Byrd and commanded by Rear Admiral George Dufek. For radio contact between bases and the outside world, the commercial and amateur communication equipment will be Collins.

The name Collins has figured prominently in polar expeditions since 1925. During Admiral Byrd's expedition of the early 30's, Collins transmitters were used in the first Arctic/Antarctic communication link—from the Byrd Expedition (Antarctic) to a CBS station in Northern Alaska. The Collins equipment is specially packaged for air drop and long sledge journeys. Superior performance and reliability, proven time and again, make Collins the logical choice when the need for radio communication is vital.

COLLINS RADIO COMPANY

CREATIVE LEADERSHIP IN ELECTRONICS



CEDAR RAPIDS, IOWA; WASHINGTON, D. C.; DALLAS, BURBANK, NEW YORK; COLLINS RADIO COMPANY OF CANADA, LTD.; OTTAWA, COLLINS RADIO COMPANY OF ENGLAND, LTD., LONDON



PUBLISHED, MONTHLY, AS ITS OFFICIAL ORGAN, BY THE AMERICAN RADIO RELAY LEAGUE, INC., WEST HARTFORD, CONN., U. S. A.; OFFICIAL ORGAN OF THE INTERNATIONAL AMATEUR RADIO UNION

STAFF

Editorial

A. L. BUDLONG, W1BUD
Editor

RICHARD L. BALDWIN, W1IKE
Managing Editor

GEORGE GRAMMER, W1DF
Technical Editor

DONALD H. MIX, W1TS
BYRON GOODMAN, W1DX
Assistant Technical Editors

EDWARD P. TILTON, W1HDO
V.H.F. Editor

C. VERNON CHAMBERS, W1JEQ
LEWIS G. MCCOY, W1ICP

E. LAIRD CAMPBELL, W1CUT
Technical Assistants

ROD NEWKIRK, W9BRD
Contributing Editor, DX

ELEANOR WILSON, W1QON
Contributing Editor, YLs

ANN B. FURR, W1ZIB
Production Assistant

LE ROY W. GARBER
Editorial Assistant

Advertising

BENTZ A. MORROW, W1VG
Advertising Manager

EDGAR D. COLLINS
Advertising Assistant

Circulation

DAVID H. HOUGHTON
Circulation Manager

J. A. MOSKEY, W1JMY
Assistant Circulation Manager

OFFICES

38 La Salle Road

West Hartford 7, Connecticut

TEL.: AD 3-6268 TWX: HF 88

Subscription rate in United States and Possessions, \$4.00 per year, postpaid; \$4.25 in the Dominion of Canada; \$5.00 in other countries. Single copies, 50 cents. Foreign remittances should be by international postal or express money order or bank draft negotiable in the U. S. and for an equivalent amount in U. S. funds.

Entered as second-class matter, May 29, 1919, at the post office at Hartford, Connecticut, under the Act of March 3, 1879. Accepted for mailing at special rate of postage provided for in section 1102, Act of October 3, 1917, authorized September 9, 1922. Additional entry at Concord, N. H., authorized February 28, 1929, under the Act of February 28, 1925.

Copyright 1956 by the American Radio Relay League, Inc. Title registered at U. S. Patent Office. International copyright secured. All rights reserved. *Quedan reservados todos los derechos. Printed in U. S. A.*

INDEXED BY
INDUSTRIAL ARTS INDEX
Library of Congress Catalog
Card No.: 21-9421

-CONTENTS-

TECHNICAL

A Complete 6146 Economy Transmitter
Lewis G. McCoy, W1ICP 11

Converters for 7, 14, 21, and 28 Mc.
Laird Campbell, W1CUT, and Byron Goodman, W1DX 18

An Accessible Antenna Tower
Herman Lukoff, W3HTF 22

The Eldico SSB-100 Exciter/Transmitter
(Recent Equipment) 30

The Hart-75 Transmitter.....
(Recent Equipment) 32

A Rugged 28-Mc. Coaxial-Antenna Design
Steve A. Horvath, W8PVZ 34

High Stability in a Crystal-Controlled VFO
Jo Emmett Jennings, W6EI 36

Linear Amplifiers for A.M.....
(Technical Topics) 39

Frequency Calibrations.....
(Technical Topics) 42

Paradox: SSB Splatter and Modern Receivers
(Technical Topics) 43

A Variable-Frequency Crystal Holder
Allen A. Engleman, W4RMU 44

Using MB-40SL as a Grid Tank..
Katashi Nose, KH6IJ 45

BEGINNER

Simple Code Practice Oscillator
David T. Geiser, W1ZEO 23

MOBILE

The Ash-Tray Mobile.....
Dean F. Pfost, W7KOT 28

OPERATING

1956 Novice Round-up.....
(Reminder) 45

W/VE Contest Results.....
57

22nd Annual ARRL DX Competition.....
(Reminder) 60

GENERAL

"Echoes" With Home Tape Recorders
George A. Bowley, W1TQS 26

"It Seems to Us . . ."	9	YL News and Views.....	58
Our Cover.....	10	Silent Keys.....	60
Coming ARRL Conventions.....	27	Correspondence from Members.....	61
WWV-WWVH Schedules.....	33	Operating News.....	62
Feed-back.....	33	With the AREC.....	66
Happenings of the Month.....	38	Station Activities.....	70
Hints & Kinks.....	46	In QST 25 Years Ago.....	136
How's DX?.....	49	ARRL QSL Bureau.....	140
World Above 80 Mc.....	83		

QUALITY PRODUCTS

BY

B&W



5100-B TRANSMITTER

Unsurpassed performance on CW, AM, and SSB. High level AM telephony—push-to-talk; clean CW keying—break-in on all bands; superlative SSB performance on all bands with the 51SB-B Sideband Generator. Input power 180 watts CW-SSB, 140 watts AM phone. Integral VFO or crystal control for 80 to 10 meter bands. Pi-network final followed by low-pass filter, and functional design throughout, keep TVI to an absolute minimum. Completely unitized construction.

Net Price \$475.00

LOW PASS FILTERS



Fight TVI by attenuating undesirable harmonics and spurious radiation by a minimum factor equal to 17,780 to 1 with this new B&W low pass filter. Wave Guide principle and novel multi-sectional construction mean more attenuation in less space at lower cost.

Net Price, Either Model, \$14.85

ALL OF THESE FINE B&W products are available at leading distributors' everywhere.

SINGLE SIDEBAND GENERATOR



The 51SB generator offers sparkling SSB performance with your present B&W, Collins, or Johnson transmitter, on 80 through 10 meters with the output frequency control presently in your transmitter.

Net Price \$279.50

MATCHMASTER



Three valuable instruments in one, the Matchmaster can be used as a dummy load, direct-reading r-f wattmeter, and an integral SWR bridge, for fast measurements on coaxial feed lines, antennas, and transmitting equipment.

Net Price \$47.50

COAXIAL SWITCHES



Model 550-A permits instant selection of any one of five 52 or 75 ohm lines. Model 551-A is a 2-pole, 2-position type used for switching various devices in or out of series connection with coax lines.

Net Price:

Model 550-A .. \$8.25

Model 551-A .. \$7.95

BALUN INDUCTORS



Two of these multi-band balun coils assure maximum transfer of power from transmitter to antenna, efficiently matching 75 ohm unbalanced outputs to 75 and 300 ohm balanced feed lines.

Net Price Each

Coil \$3.75

WATCH FOR the big value announcement on B&W's new L-1000A 1 KW Single Sideband Linear Amplifier!

All prices subject to change without notice.

Barker & Williamson, Inc.

237 Fairfield Ave., Upper Darby, Pa.

NOW AVAILABLE AT NO EXTRA COST

SSB

PR CRYSTALS FOR 75 METER
AND 20 METER PHONE...IN
THE 5 TO 5.5 MC. RANGE

Now you can enjoy commercial
crystal stability on SSB at ama-
teur prices. Because of increased

demand, PR is now making available
Type Z-2 Crystals in the 5 to 5.5 MC.
range at \$2.95 . . . for use with SSB
exciters, such as the 10B and 20A for
operation in the 75 meter and 20 meter
phone bands. Pick your frequencies
(integral kilocycle) and order from
your dealer at this new, low price.
Formerly PR crystals in this range
were available only in commercial
types selling for several times this
amount.

On SSB, where stability becomes of
utmost importance, there's nothing like
crystal control with PRs . . . neg-
ligible drift (limited to less than 2
cycles per MC. per degree C). You
can avoid the continuous annoyance
of drift by depending on PRs . . . then
you KNOW where you are, and you
know you will stay there!



5.0 MC. to 5.5 MC. Range

PR Crystals



Since 1934

USE **PR** AND KNOW WHERE YOU ARE

PETERSEN RADIO COMPANY, INC.
3800 W. BROADWAY • COUNCIL BLUFFS, IOWA

EXPORT SALES: Royal National Company, Inc., 8 West 40th Street, New York 18, N. Y., U. S. A.

Section Communications Managers of the ARRL Communications Department

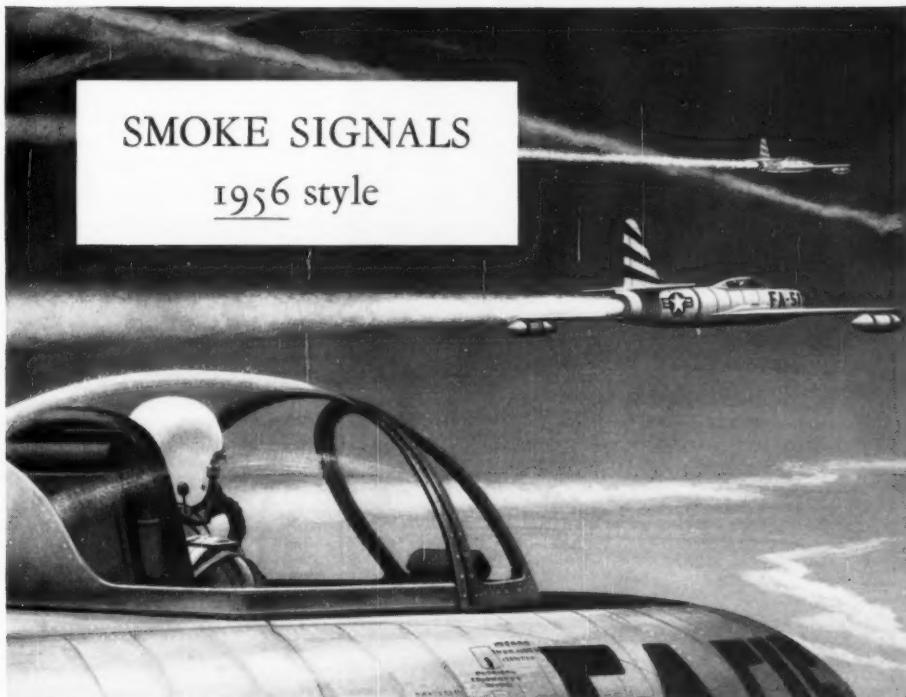
Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in *QST*. **ARRL Field Organization station appointments** are available in the areas shown to qualified League members. These include ORS, OES, OPS, OO and OBS. SCMs also desire applications for SEC, EC, RM and PAM where vacancies exist. *All amateurs* in the United States and Canada are invited to join the Amateur Radio Emergency Corps (ask for Form 7).

ATLANTIC DIVISION			
Eastern Pennsylvania	W3PVF	Clarence Snyder	717 Porter St.
Maryland-Delaware-D. C.	W3PRL	J. W. Gore	717 Woodbine Ave.
South New Jersey	K2BC	Herbert L. Brooks	800 Lincoln Ave.
Western New York	W2SJN	Edward Graf	81 King St.
Western Pennsylvania	W3NCD	R. M. Heck	RFD 1
CENTRAL DIVISION			
Illinois	W9YIX	George Schreiber	239 S. Scoville Ave.
Indiana	W9NIA	Seth L. Baker	276 West Sumner Ave.
Wisconsin	W9RQM	Reno W. Goetsch	629 S. 7th Ave.
DAKOTA DIVISION			
North Dakota	W0K7Z	Elmer J. Gabel	Custer State Park
South Dakota	W0FLP	Les Price	1611 1/2 E. Lake St.
Minnesota	W0MXC	Charles M. Bove	
DELTA DIVISION			
Arkansas	W5FMF	Owen G. Mahaffey	Box 157
Louisiana	W5WDO	Thomas J. Murgavai	3409 Beaulieu St.
Mississippi	W5WZY	Julian G. Blakely	104 N. Poplar St.
Tennessee	W4SCF	Harry C. Simpson	1861 So. Wellington St.
GREAT LAKES DIVISION			
Kentucky	W4SBI	Robert E. Fields	531 Central Ave., (Kentucky side)
Michigan	W8RAE	Thomas G. Mitchell	409 Liberty
Ohio	W8AL	Wilson E. Weckel	2118 Tuscarawas St., W.
HUDSON DIVISION			
Eastern New York	W2ILI	Stephen E. Johnson	1 River St.
N. Y. C. & Long Island	W2TQR	Harry J. Dannals	139 East Zoranne Drive
Northern New Jersey	W2VQR	Lloyd H. Manamon	709 Seventh Ave.
MIDWEST DIVISION			
Iowa	W0BDR	Russell B. Marquis	807 North Fifth Ave.
Kansas	W0ICV	Earl N. Johnston	1100 Crest Drive
Missouri	W0GEP	James W. Hoover	15 S. Cunningham Lane
Nebraska	W0CBH	Floyd B. Clegg	201 N. 8th St.
NEW ENGLAND DIVISION			
Connecticut	W1EFW	Milton E. Chaffee	53 Homestead Ave.
Maine	W1B1V/VYA	Allan D. Duntley	
Eastern Massachusetts	W1ALP	Frank L. Baker, Jr.	91 Atlantic St.
Western Massachusetts	W1HWR	Osborne R. McKerahan	22 Mutter St.
New Hampshire	W1HWR	Henry C. Williams	121 Hollins
Rhode Island	W1KKR	Walter B. Hanson, Jr.	10491 Powell Blvd.
Vermont	W1RNA	Robert L. Scott	511 E. 71st St.
NORTHWESTERN DIVISION			
Alaska	KL7AGU	Dave A. Fulton	Box 103
Idaho	W7IWU	Alan K. Ross	2105 Irene St.
Montana	W7WU	Leon E. Miller	121 Hollins
Oregon	W7ESI	Edward F. Conyngham	101 Belmont St.
Washington	W7FIX	Victor S. Gish	119 North Rhett Ave.
PACIFIC DIVISION			
Hawaii	KH6AED	Samuel H. Lewbel	P.O. Box 3564
Nevada	W7JU	Ray T. Warner	539 Birch St.
Santa Clara Valley	W6WGO	R. Paul Tibbs	1946 Harmi Way
East Bay	W6WGO	Robert E. Weller	3019 Berlin Way
San Francisco	W6GGC	Walter A. Buckley	16 Canyon Way
Sacramento Valley	W6IDN	Harold L. Lucero	1113 Elinore St.
San Joaquin Valley	W6IPU	Ralph Saroyan	3639 Mono St.
ROANOKE DIVISION			
North Carolina*	W4ZQB	Allen L. Guin, Jr.	146 Stonewall Jackson Homes
South Carolina	W4ANK	T. Hunter Wood	170 N. North Rhett Ave.
Virginia	W4KX	Johnnie L. Morgan	16 E. Station WFEVA, Box 269
West Virginia	W8PQQ	Albert H. Hines	101 E. Belmont St.
ROCKY MOUNTAIN DIVISION			
Colorado	W0HEM	James B. Simpson	825 South Weber St.
Utah	W7UTM	Floyd L. Hinshaw	165 East 4th, North
Wyoming	W7PKX	Wallace J. Ritter	P.O. Box 797
SOUTHEASTERN DIVISION			
Alabama	W4MI	Joe A. Johnson	Box 462
Eastern Florida	W4FE	Arthur H. Benze	
Western Florida	W4MS	Edward J. Collins	
Georgia	W4NS	George W. Parker	
West Indies (Cuba-P.R.-V.I.)	KP4DJ	William Werner	
Canal Zone	KZ5RM	Roger M. Howe	
SOUTHWESTERN DIVISION			
Los Angeles	W6CMN	William J. Schucht	1707 Beck Ave.
Arizona	W7LVR	Albert Steinbrecher	RFD 5, Box 800
San Diego	W6LNU	Don Stansifer	4427 Pescadero
Santa Barbara	W6QIW	William B. Farwell	99 Grapevine Road
WEST GULF DIVISION			
Northern Texas	W5RRM	Cecil G. Cook	3750 Singleton Road
Oklahoma	W5RST	Dr. Will G. Crayton	State Veterans Hospital
Southern Texas	W5QDX	Morley Bartholomew	RFD 7, Box 65
New Mexico	W5FPB	Einar H. Morterud	2717 Quincy St., N.E.
CANADIAN DIVISION			
Maritime	VE1OM	Douglas C. Johnson	104 Preston St.
Ontario	VE1IA	G. Eric Farquhar	16 Emerald Crescent
Quebec	VE1GL	Gordon A. Lynn	R.R. No. 1
ALBERTA DIVISION			
Alberta	VE6MJ	Sydney T. Jones	10706-57th Ave.
British Columbia	VE7JT	Peter M. McIntyre	981 West 26th Ave.
Yukon			
Manitoba	VE4HL	John Polmark	109-11th, N.W.
Saskatchewan	VE5HR	Harold R. Horn	1044 King St.

* Official appointed to act temporarily in the absence of a regular official.

SMOKE SIGNALS

1956 style



Those white vapor trails coursing the sky tell a story of vast importance today . . . a story of power, performance, protection. The planes responsible for these modern "smoke signals" are America's guardians. Each one is a masterpiece of engineering skill . . . superbly equipped for the detection and destruction of attackers. Much of the electronic equipment in these planes . . . radar, communication and control-operation equipment . . . is made by Hallicrafters, a "primary producer" for the Armed Forces. As a pioneer in electronics, Hallicrafters has the ability, experience and production facilities necessary for such vital products.

see  hear see  **hallicrafters**

4401 West Fifth Avenue, Chicago 24, Illinois

*World's largest exclusive manufacturers
of communications radio*

HALLICRAFTERS FACILITIES ARE NOW BEING USED FOR THE DEVELOPMENT AND PRODUCTION OF: GUIDED MISSILE CONTROL EQUIPMENT
COMMUNICATIONS EQUIPMENT • COUNTERMEASURE EQUIPMENT • COMBAT INFORMATION CENTER
HIGH FREQUENCY ELECTRONIC EQUIPMENT • MOBILE RADIO STATIONS • MOBILE RADIO
TELETYPE STATIONS • PORTABLE TWO-WAY COMMUNICATIONS EQUIPMENT • RADAR RECEIVERS
AND TRANSMITTERS (ALL FREQUENCIES) • RADAR EQUIPMENT

THE AMERICAN RADIO RELAY LEAGUE, INC.

is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, and for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

All general correspondence should be addressed to the administrative headquarters at West Hartford, Connecticut.



Past Presidents

HIRAM PERCY MAXIM, W1AW, 1914-1935
EUGENE C. WOODRUFF, WBCMP, 1936-1940
GEORGE W. BAILEY, W2KH, 1940-1952

Officers

President	GOODWIN L. DOSLAND, W0TSN Moorhead, Minnesota
First Vice-President	WAYLAND M. GROVES, W5NW P.O. Box 586, Odessa, Texas
Vice-President	FRANCIS E. HANDY, W1BDI 38 La Salle Road, West Hartford, Connecticut
Vice-President	PERCY C. NOBLE, W1BVR 37 Broad St., Westfield, Massachusetts
Secretary	A. L. BUDLONG, W1BUD 38 La Salle Road, West Hartford, Connecticut
Treasurer	DAVID H. HOUGHTON 38 La Salle Road, West Hartford, Connecticut

* * * * *

General Manager	A. L. BUDLONG, W1BUD
Communications Manager	FRANCIS E. HANDY, W1BDI
Technical Director	GEORGE GRAMMER, W1DF 38 La Salle Road, West Hartford, Connecticut
General Counsel	PAUL M. SEGAL 816 Connecticut Ave., Washington 6, D.C.

Assistant Secretaries:
JOHN HUNTOON, W1LVQ LEE AURICK, W1RDV
PERRY F. WILLIAMS, W1UED
38 La Salle Road, West Hartford, Connecticut

DIRECTORS

Canada

ALEX REID VE2BE
240 Logan Ave., St. Lambert, P.Q.
Vice-Director: William R. Savage VE6EO
329 15th St. N., Lethbridge, Alta.

Atlantic Division

GILBERT L. CROSLEY W3YA
Dept. of E.E., Penna. State University
State College, Pa.

Vice-Director: Charles O. Badgett W3LVF
725 Garden Road, Glenside, Pa.

Central Division

HARRY M. MATTHEWS W9UQT
701 No. 88th Street, Springfield, Ill.
Vice-Director: George E. Keith W9QLZ
RFD 2, Box 22-A, Utica, Ill.

Dakota Division

ALFRED M. GOWAN W0PHR
1012 South Willow Ave., Sioux Falls, S. D.
Vice-Director: Forrest Bryant W0FDS
6840 Harriet Ave., Minneapolis, Minn.

Delta Division

VICTOR CANFIELD W5BSR
Box 965, Lake Charles, La.
Vice-Director: Milton W. Kirkpatrick W5KYC
113 Park Ave., Hattiesburg, Miss.

Great Lakes Division

JOHN H. BRABB W8SPF
708 Ford Ridge, Detroit 26, Mich.
Vice-Director: Robert L. Davis W8EYE
247 Highland Ave., Salem, Ohio

Hudson Division

GEORGE V. COOKE, JR. W2OBU
88-31 239 St., Bellrose 26, N. Y.
Vice-Director: Thomas J. Ryan, Jr. W2NKD
2339 Redwood Rd., Scotch Plains, N. J.

Midwest Division

ROBERT W. DENNISTON W8NWX
Box 631, Newton, Iowa
Vice-Director: Sumner H. Foster W9GQ
2315 Linden Dr., SE, Cedar Rapids, Iowa

New England Division

PHILIP S. RAND W1DBM
Route 58, Redding Ridge, Conn.
Vice-Director: Clayton C. Gordon W1HRC
65 Emerson Ave., Pittsfield, Mass.

Northwestern Division

R. REX ROBERTS W7CPY
837 Park Hill Drive, Billings, Mont.
Vice-Director:

Pacific Division

HARRY M. ENGWICHT W6HIC
770 Chapman, San Jose 26, Calif.
Vice-Director: Harold L. Lucero W6JDN
1113 Elinore Ave., Dunsunuir, Calif.

Roanoke Division

P. LANIER ANDERSON, JR. W4MWH
428 Maple Lane, Danville, Va.
Vice-Director: Theodore P. Mathewson W4FJ
110 N. Colonial Ave., Richmond, Va.

Rocky Mountain Division

CLAUDE M. MAER, JR. W0IC
740 Lafayette St., Denver, Colo.
Vice-Director: Walter M. Reed W0WRO
1355 E. Amherst Circle, Denver, Colo.

Southeastern Division

JAMES P. BORN, JR. W4ZD
25 First Ave., N.E., Atlanta, Ga.
Vice-Director: Thomas M. Moss W4HYW
P.O. Box 644, Municipal Airport Branch,
Atlanta, Ga.

Southwestern Division

WALTER R. JOOS W6EKM
1315 N. Overland Drive, Inglewood 3, Calif.
Vice-Director: Robert E. Hopper W6YXU
4327 Santa Cruz, San Diego 7, Calif.

West Gulf Division

ROBERT E. COWAN W5CF
3640 Encanto Drive, Fort Worth 9, Texas
Vice-Director: John F. Skeletton W5MA
1901 Standish Dr., Irving, Texas

"It Seems to Us..."



INTERLOPERS IN OUR BANDS

One of the questions we're most frequently asked, whether on trips to clubs or conventions, or by letter to HQ, is: "Howcum these non-amateur stations are operating in our amateur bands — especially the broadcasters in the 7-Mc. band — and why don't we get them out?" It seems to us it's a good time to talk about this in *QST*.

Without any doubt, the prime sources of concern and indignation are the broadcasters operating in our 7-Mc. band, so let's take that one up first. Why are they there, and why don't we throw them out? Well, it may come as a bit of surprise to our newer amateurs, especially in North and South America, but those European broadcasters operating between 7100-7300 kc. have every right to be there, under international agreement. Only in the Americas is the band 7000-7300 kc. an exclusive amateur band. In the rest of the world amateurs can't operate at all between 7150-7300 kc.; that territory is allocated to broadcasting, with the sole exceptions that Nationalist China and New Zealand may permit their amateurs to operate there, with 100 watts peak power, along with broadcasting. As for 7100-7150, we've got just about the same story all over again except for the Union of South Africa; outside of the Americas, it is primarily allocated to broadcasting. Amateurs may be permitted there (though not necessarily) but they can't interfere with broadcasting. South Africa, alone of the countries outside our hemisphere, specified 7100-7150 is still an exclusive amateur allocation with her.

Thus, when you hear broadcasting stations operating outside the American continents in the band 7100-7300 you are listening to perfectly legal operation. It's tough at times, mates, but at least here in the Western Hemisphere we have the consolation that our governments have still insisted on 7000-7300 kc. for amateurs, *exclusively*, and you can be thankful you live here; also, the sunspot cycle is changing so that the interference from the broadcasters will be decreasing for some years.

How did this all come about? Simple: the world is propaganda conscious and most of it thinks broadcasting is an effective medium. International broadcasting first became wide-

spread in the thirties. With conflicting ideologies rampant in the latter part of that decade it started to grow, and that was easier in other countries because broadcasting is almost always a government project. It has been growing ever since and it is crowding on the heels of every service, not just us amateurs. For instance: at the 1947 world radio conference held in Atlantic City (the most recent conference where allocations were kicked around) the international broadcasting service — and remember we're talking about the governments themselves, not private interests — picked up 450 additional kc. of territory for their use from the fixed and mobile services, between 6 and 22 Mc. That's in addition to the 50/100 they picked up from amateurs — except, remember, that they didn't pick up a single kc. from amateurs in the Americas, where all our governments stood firm against any such goings-on.

At any rate, that's how matters stand, legally, and if you are occasionally annoyed by broadcasters in the 7-Mc. band (7100-7300) just remember that except for the Americas most amateurs can't use it at all.

Now, on 3.5: You'll hear fixed and mobile stations there occasionally, including teletype. If such stations are located in the United States or Canada, they're illegal; in our two countries the whole band 3500-4000 kc. is exclusively amateur. But if you hear stations in almost any other country of the world, including all of South America and most of Central America, they are probably legal. We do want to say this: while South and Central American amateurs themselves have never shown too much interest in this band, primarily because of the high noise level there and the greater distances involved, the administrations themselves are sympathetic to our U. S.-Canada amateur requirements and, generally speaking, keep their fixed and mobile operations in the low-power category. And a tip of the hat to them for that!

14 Mc.: It is an exclusive amateur band all over the world, except that the Russians have reserved the right to operate some of their fixed stations in the top 100 kc. there. Otherwise, here is one band where *anything* except amateur is illegal, and we want to hear about *any* other than amateur stations there. The same goes for the 21-Mc. band. It's all ours.

Summing up: If you hear fixed or mobile stations on 3.5 Mc. anywhere outside U. S. and Canada, they're quite possibly legal. However, if you hear any *broadcasting* it isn't legal in South and Central America, and may not be elsewhere. If you hear anything at all from 7000-7100 kc. that isn't amateur, no matter what service or from what country, it is illegal. From 7100-7300 anything in the way of broadcasting — so long as it's outside the Americas — may be and probably is legal, but *only* broadcasting (no fixed). On 14 and 21 Mc. anything except amateur (except Russian fixed on 14-Mc.) is illegal.

With these broad guides, we now want to ask every U. S. and Canadian amateur to report to us anything heard in our bands that he thinks doesn't belong there. It is true that the shift to the new Atlantic City allocations isn't yet complete and some stations admittedly are operating illegally until they can find a place to move to. Nevertheless, it is essential to all of us, if we are to exert the best effort we can to maintain our own frequency rights, to report anything . . . *anything* . . . suspected of not belonging in our territory. HQ. wants such reports. We will do the screening here. Don't report the occasional "in-and-outter" — it happens to the best of us. But when you hear a station operating consistently in our bands, where you think he should not be, let us know about it (some U. S. stations occasionally have accidentally wandered in, for instance). Reports need not be complicated but they should include all available information as to time, call and frequency, and especially information on some amateur station they were interfering with that you were trying to hear or work. Check for image response. We have a form, CD-36, available on request for these monitoring reports.

We have means for protesting illegal stations in our bands, through our extremely sympathetic U. S. and Canadian administrations. Those protests don't always have an immediate effect but it is essential that we file them against illegal stations seeking to establish "squatters rights." All we need is your cooperation in reporting them.

»

Concluding more than *twenty-three years*' service as QSL Manager for the second call area, Henry Yashin, W2SN, has reluctantly decided it is about time to take things easy for awhile. More than any other single person, W2SN has been responsible for the success of the present QSL system; for more than two decades he has worked quietly and devotedly in the interests of thousands of his fellow-amateurs. During his tenure, he has handled 862,744 cards — a record both in volume and in years of service.

Since the news "Hank" was resigning got around, we've received dozens of appreciative letters about him. We know we speak for their writers and uncounted other amateurs in wishing "Hank" well in the years ahead and extending to him the thanks of all of us for a superb job!

(Photo Courtesy of Newark Evening News)

ARE YOU LICENSED?

• When joining the League or renewing your membership, it is important that you show whether you have an amateur license, either station or operator. Please state your call and/or the class of operator license held, that we may verify your classification.

Strays

Richard A. Schomburg, W7WUM, Opportunity, Washington, wonders how many VE's have ever noticed the inscription "We wine when we work willingly" inscribed in International Morse Code around the border of the reverse face of Canadian nickels. He says that the 1945 issue is a good example.

Overheard in a recent public information announcement from Seattle, Washington: In giving general instruction for receiving broadcasts reference was made to "the control of electrogrammatic radiation." Any wonder the man in the street is confused these days?

In the consideration of safety, a group of mobileers in Fort Worth, Texas, is using china grease marking pencils for recording calls, handles and other data. They just write information on the windshield right in front of their eyes. In this way one need not take his eyes from the road to record notes or jog his memory.

OUR COVER

Sunshine or no, the groundhog will stay above ground after he sees our cover this month! W1ICP's latest rig is easy on the eyes, and easy on the pocketbook, but with plenty of performance. "Eyes right" for a full description.



A Complete 6146 Economy Transmitter

Phone and C.W., 80 through 10 Meters, VFO or Crystal

BY LEWIS G. McCOY, WIICP

• This transmitter design should appeal to quite a few of our readers, since an effort was made to build in at rock-bottom cost as many of the commonly-desired features as possible. It makes a good rig for an experienced Novice who wants to run his power limit, and the conversion to VFO operation for General operation is a simple matter. Completely self-contained and convenient to operate, it is a hard design to beat.

HERE can be no doubt that bandswitching transmitters are currently enjoying great popularity. In bygone days an amateur was content with one-band operation, but like the man says, you don't hardly see them no more. What the average Joe Ham is interested in these days is complete bandswitching, 'phone and c.w., compactness, and freedom from TVI. The transmitter shown in the photographs and described in this article makes every effort to fulfill these requirements. In addition, several other features are incorporated into the rig.

In designing this rig, consideration was given to such things as keying, adequate drive on all bands when using 80-meter crystals or VFO, and means for controlling the power output. The latter is a helpful feature if the unit is used to drive a high-power tetrode amplifier. Last, but by no means least, the cost was held to a minimum; the completed transmitter cost approximately \$90.00 without the meter.

The R.F. Circuit

As can be seen in Fig. 1, the r.f. section consists of a 5763 oscillator, a 5763 buffer-multiplier, and a 6146 amplifier. Either 3.5- or 7-Mc. crystals

The VFO and transmitter front view showing the VFO connected to the crystal socket. The controls on the transmitter are as follows: starting at lower left and going to the right, crystal socket, c.w.-phone switch, key jack, output socket, VFO switch jack; second row at left, oscillator plate switch, plate tuning, c.w.-test-phone switch; next row, at left, is the drive control, at right is output control, immediately above is grid tuning, amplifier tuning and bandswitch. The meter switch is below the meter and the fine loading control is at the left. The coarse loading control is in the upper left-hand corner.

can be used in the oscillator, depending on the output frequency desired. The feed-back adjustment is controlled by C_2 , the setting depending on the degree of crystal activity. C_1 is wired into the circuit when VFO control is used. The plate circuit of the oscillator can be untuned or peaked in the 40-meter band by C_3 , depending upon the following-stage drive requirements.

The buffer-multiplier stage output can be varied by the 25K potentiometer. This control varies the excitation reaching the grid of the amplifier. The multiplier stage works as a doubler for 20-meter operation, a tripler for 15, and quadrupler for 10. This is done without switching by the use of the multiband tuner $L_2L_3C_4$.

A pi network is used in the plate circuit of the 6146. The correct inductance for each band is obtained by switching in tapped sections of L_5L_6 . The pi network is designed to work into a 52- to 72-ohm load. The output capacity is a dual broadcast t.r.f.-type variable of $365-\mu\text{uf}$. per section, and three $470-\mu\text{uf}$. fixed capacitors. When the transmitter is switched to the test position, the screen of the 6146 is grounded, enabling the operator to tune up without danger of damaging the tube.

The transmitter is keyed by feeding the screen voltage through the 12BH7 keyer tube. In the key-up position, -115 volts is applied to all three screens, cutting off the output. In the key-down position the screen voltage rises to the normal operating range. The keyed signal is shaped by R_2C_6 . The 100K potentiometer serves as an output control, an extremely useful device when driving an amplifier or when using an s.w.r. bridge.

Modulator and Power Supply

The modulator (Fig. 2) uses a 12AX7 dual triode acting as a two-stage resistance-coupled



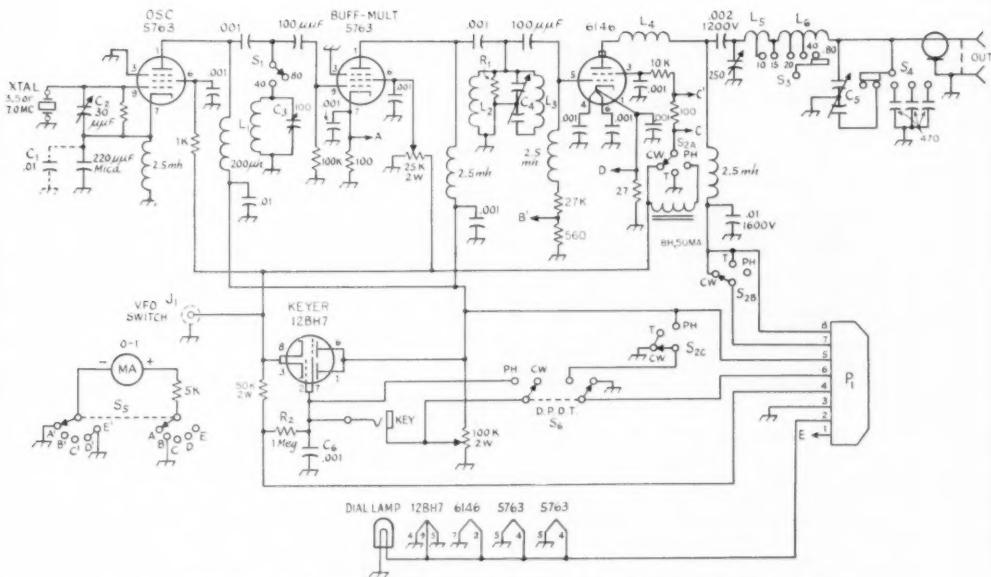


Fig. 1 — Circuit diagram of the r.f. unit. All capacitances given in microfarads unless otherwise specified.

C_3 — $100\text{-}\mu\text{f.}$ midget variable (Hammarlund HF100).

C_4 — $140\text{-}\mu\text{f.}$ -per-section variable (Hammarlund HFD140).

C_5 — $365\text{-}\mu\text{f.}$ -per-section variable (Broadcast replacement type).

R_1 — 6000 ohms, 1 watt (two 12,000-ohm resistors in parallel).

L_1 — 30 turns No. 24, $\frac{5}{8}$ -inch diam., 15/16 inches long (B & W 3012).

L_2 — 32 turns No. 24, $\frac{5}{8}$ -inch diam., 1 inch long (B & W 3012).

L_3 — 14 turns No. 20, $\frac{5}{8}$ -inch diam., $\frac{3}{8}$ inch long (B & W 3007).

L_4 — 4 turns No. 16, $\frac{1}{4}$ -inch diam., $\frac{3}{8}$ -inch long.

L_5 — 8 turns No. 12, 1-inch diam., $\frac{13}{16}$ inches long. 28 Mc. — tap 4 turns from input end.

21 Mc. — tap 7 turns from input end.

L_6 — 17 turns No. 14, 2-inch diam., $\frac{21}{16}$ inches long (B & W 3900).

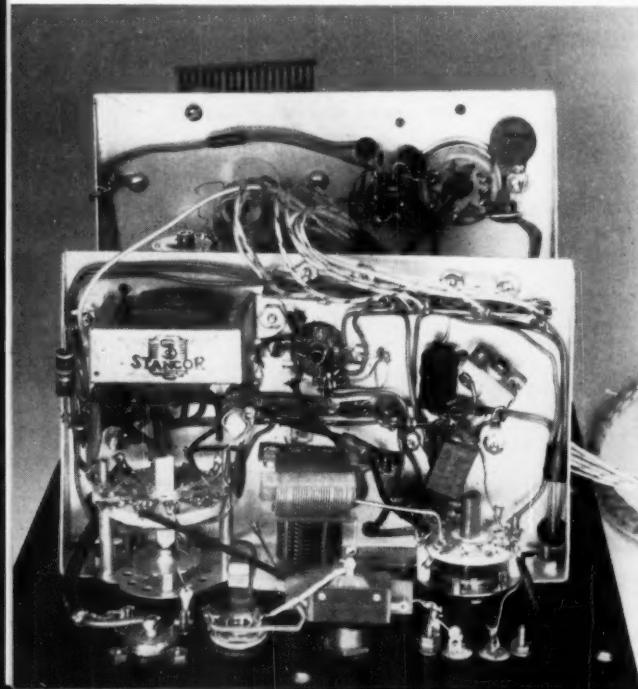
14 Mc. — tap $1\frac{1}{4}$ turns from junction of L_2 and L_6 .

7 Mc. — tap $10\frac{1}{2}$ turns from junction of L_3 and L_6 .

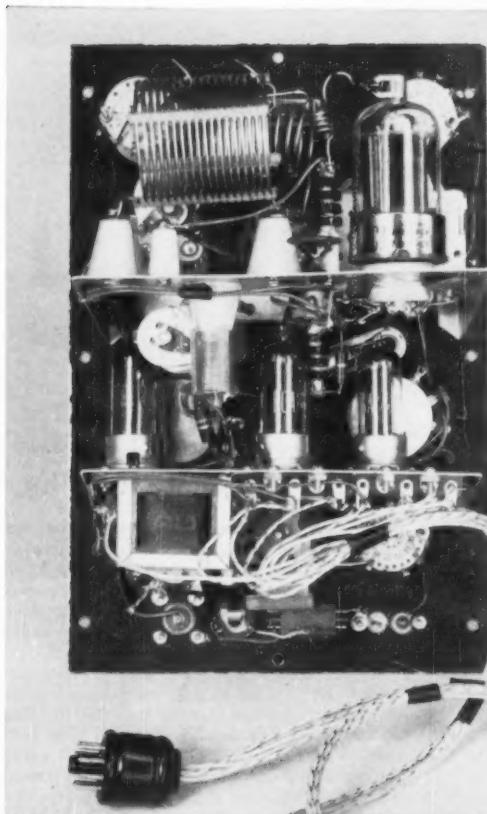
S_1 — Single-pole 6-position steatite wafer (Centralab PA-2001).

S_2 — Three-pole 3-position steatite wafer (Centralab 2507).

S_3 , S_4 — Single-pole 5-position steatite wafer, progressively shorting (Centralab PA-2042).



Bottom view of r.f. section showing components mounted below first shelf. The switch at the left is S_2 , the c.w.-test-phone control. To the right of S_1 is L_1C_3 , the oscillator plate circuit for 40-meter output. The leads from the modulator/power plug are connected to terminal lugs which are visible at the upper edge of the shelf.



Rear view of the r.f. assembly showing modulation and power plug, P_1 . The choke shown at left below the lower deck is L_4 . Immediately above the choke is L_2 which is mounted by means of Duco cement to a one-inch cone. L_6 is mounted on one-inch cones at the upper left-hand corner.

amplifier, followed by a 6C4 triode transformer-coupled to the grids of two 1614s. The modulator operates in Class AB₁ and will easily furnish 30 watts output, sufficient to modulate the 6146 at 60 watts input. Either a crystal or dynamic microphone can be used.

¹ Grammer, "More Effective Utilization of the Small Power Transformer," *QST*, Nov., 1952.

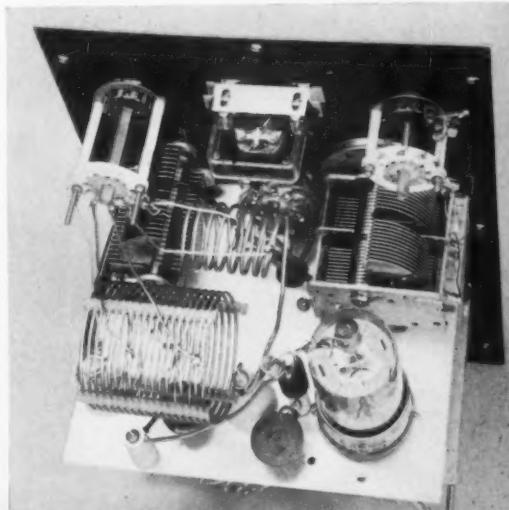
Top view of the 6146 amplifier and pi-network components. The 250- μ uf. variable is visible at the left below the bandswitch. The high-frequency range coil, L_5 , is between the meter and the low-frequency coil, L_6 . At the right are the output capacitors, C_8 and the three 470- μ uf. fixed units which are mounted on the switch.

By using suitable values for the coupling capacitors between the two sections of the 12AX7 and the 6C4, the frequency response below 500 cycles is attenuated. The high-frequency response is limited by the 470- μ uf. capacitor across the secondary of T_1 and the 0.002- μ f. unit across the secondary of the modulation transformer. The over-all response of the amplifier is thereby restricted to the most useful range.

The power supply is the economy-type¹ that utilizes a replacement-type transformer. Instead of the usual two 6X5 rectifiers, an additional pair is added to furnish adequate current-carrying capacity. The low voltage is approximately 290 volts and the high voltage is 580 under a load of 155 ma. to the output stage. The supply was tested for extensive periods under a load of about 250 ma. without any apparent damage. Negative voltage for biasing the modulators and the keying circuit is furnished by T_4 and CR.

VFO

The VFO (Fig. 3) is a 5763 tuned to 160 or 40 meters, depending on the operating frequency desired. The oscillator is turned on and off through a 6AL5 that acts as a switch. A lead is connected between the screen bus in the transmitter to the cathodes of the 6AL5. When the key is closed, the oscillator turns on before the rest of the stages. When the key is opened, the oscillator stays on slightly longer than the other stages. This action provides differential keying, one of the better methods for chirp-free break-in keying a VFO-controlled transmitter.



The power supply of the VFO is conventional and uses two 0B2s in series to furnish a regulated 220 volts on the screen and plate of the 5763. The output of the VFO is coupled to the crystal socket of the transmitter through a short length of 52-ohm coax.

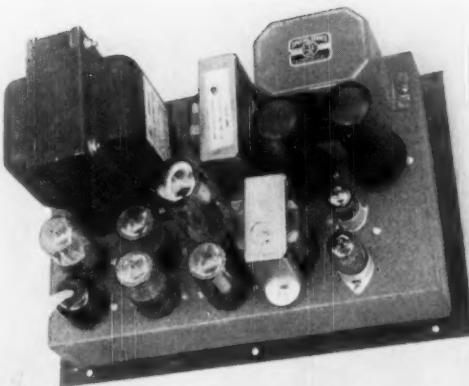
Metering and Switching Circuits

Metering of the rig is accomplished by a 0-1 milliammeter connected as a 0-5 voltmeter. Currents are indicated by the voltage drops across suitable resistors in series with the circuits to be measured. The ranges selected were as follows: buffer cathode, 50 ma.; amplifier grid, 10 ma.; amplifier screen, 50 ma.; amplifier cathode, 200 ma.; modulator cathodes, 200 ma.

The various switching circuits are as follows. The plate circuit of the oscillator is changed from tuned by S_1 , S_3 and S_4 respectively the bandswitching and loading of the pi network. S_2 serves as a C.W.-TEST-PHONE switch, the secondary of the modulator transformer being shorted when switched to c.w. or test. The d.p.t. toggle S_6 is used to switch the rig on and off when operating phone. In the off position, the screens of the modulators are grounded. The power supply is turned on by first closing S_7 and allowing the 6X5s to warm up and then S_8 is closed, which turns on all the heaters and other voltages.

Construction of R.F. Section

The transmitter, modulator and power supply are all enclosed in an ICA 8 \times 11 \times 12-inch steel cabinet. As can be seen in the photographs, the r.f. section is mounted on two shelves, the bottom one holding the oscillator, buffer, and keying circuits and the top shelf the amplifier. The shelves are made from sheet aluminum, the



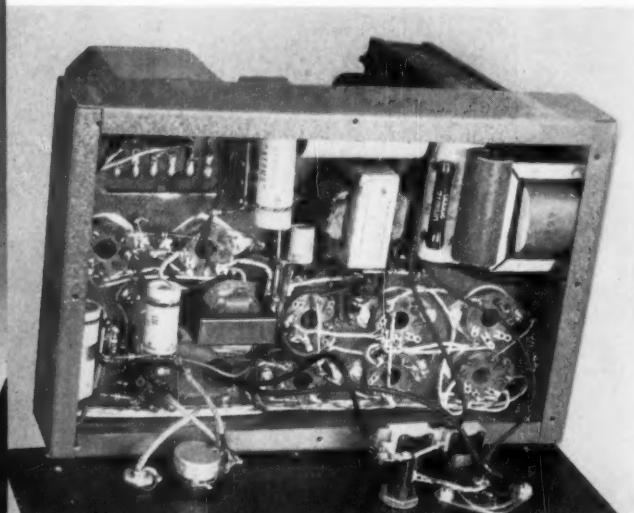
Power supply and modulator assembly showing placement of parts. The modulation transformer is at the upper right, next to the pair of 1614s. The transformer on the left-hand side, which is above the rectifiers, is T_5 , the filament transformer for the 6X5s. The plug P_1 is shown plugged in at the lower left-hand corner.

untuned to take care of the bandswitching and loading of the pi network. S_2 serves as a C.W.-TEST-PHONE switch, the secondary of the modulator transformer being shorted when switched to c.w. or test. The d.p.t. toggle S_6 is used to switch the rig on and off when operating phone. In the off position, the screens of the modulators are grounded. The power supply is turned on by first closing S_7 and allowing the 6X5s to warm up and then S_8 is closed, which turns on all the heaters and other voltages.

lower shelf measuring $6\frac{3}{4} \times 4\frac{1}{4}$ inches, and the upper $6\frac{3}{4} \times 5\frac{1}{2}$ inches. Both shelves are made up with a $\frac{1}{2}$ -inch lip for mounting to the front panel. Placement of the tubes and components is not critical. However, if a symmetrical panel arrangement is desired, the layout should follow the photographs.

In the unit shown, the shelves were first drilled and punched to take the components and then they were temporarily mounted in place on the panel. The panel was drilled after being marked off for the controls. All controls around the outer edges should be mounted in a position where they will clear the $\frac{1}{2}$ -inch lip on the steel cabinet. (Check the front-view photograph for placement of the various controls.)

When all the components are mounted in place, the r.f. assembly can be wired. If he desires additional TVI prevention, the constructor can use shielded wire for all d.c. and 60-cycle leads. However, in the unit shown, it was felt that in all but fringe areas, the complete metal enclosure



Bottom view of modulator and power section. The microphone jack and the audio gain control are mounted on the back panel of the transmitter cabinet and are shown at the lower left-hand corner. The 115-volt jack, the fuse holder, and S_7 are at lower right-hand corner of the panel. The terminal socket, J_2 , is the octal socket at the lower right-hand corner of the chassis. The inductance at the upper right is L_1 and the transformer just to its left is T_4 .

would be adequate. A good tight metal enclosure with the output fed through a low-pass filter furnishes excellent harmonic attenuation.

To facilitate making up the 2½-foot cable that connects the power plug to the tie points (see photograph), it is a good idea to number the terminals on the strips. The oscillator plate coil, L_1 , is mounted on C_3 by cementing one of the coil support bars to the stator bars at the back of the capacitor. A few small drops of Duco cement will hold the coil in place. In the grid circuit of the 6146, L_3 is held in place by soldering the ends of the coil to the stator terminals of

made by International Instrument Co. It is smaller than a standard two-inch meter but there is sufficient space to mount the latter type if the constructor desires.

Power Supply and Modulator Construction

The two sections are mounted on a $7 \times 11 \times 2$ -inch steel chassis. If the layout shown in the photographs is followed, the constructor will find there is sufficient space both above and below the chassis for all the components. As the chassis is mounted to the back panel of the steel cabinet, care should be taken to insure that

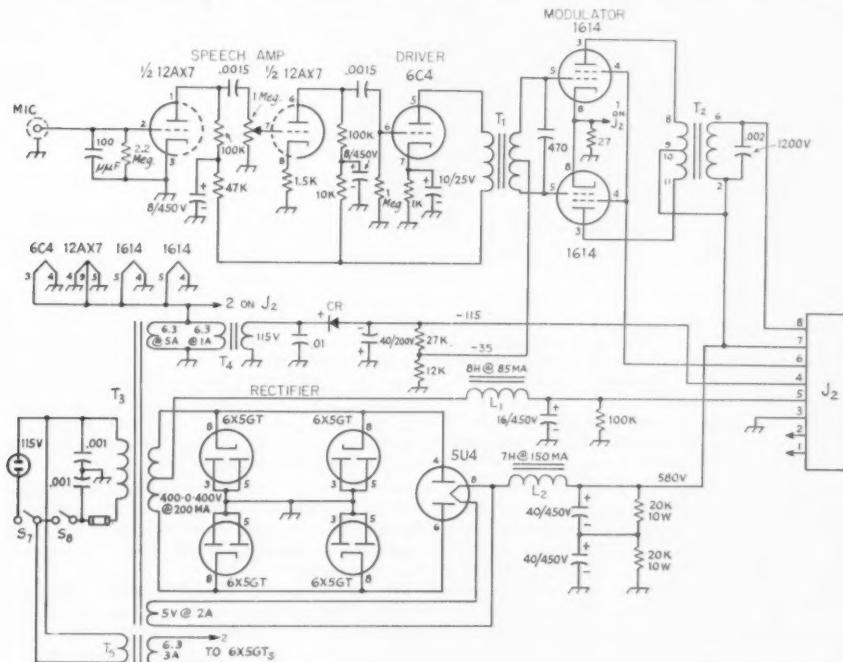


Fig. 2 — Circuit diagram of power supply and modulator. All capacitances given in microfarads unless otherwise specified.

CR — Selenium rectifier 150 v. 20 ma. (Federal 1158).
 T₁ — Interstage audio transformer, center-tapped secondary, 10-ma. primary, total secondary-to-primary turns ratio 3 to 1 (Triad A-31X).
 T₂ — Universal modulation transformer, 30 watts (UTC S-19).

C₄. There are two purposes served by *R₁* in the multiband circuit. First, it helps to level off the amount of drive at the lower frequencies while having very little effect on the higher bands. Second, it helps to stabilize the amplifier, particularly at the lower frequencies where several stages are operating on the same band.

The final-amplifier wiring is straightforward, as a look at the top-view photograph will show. There will no doubt be a question in the minds of many readers as to the meter used in the rig. It is a new type called a "slide-indicating meter."

T₃ — Power transformer, 400 v. each side of c.t., 200 ma., 6.3 v. at 5 amp, 5 v. at 3 amp. (Stancor PC-8412).

T₄ — Transformer, 6.3 v. at 1 amp. (Stancor P-6134).
T₅ — Transformer, 6.3 v. at 3 amp. (Stancor P-6466).
Fuse in primary of T₂ is 3-amp.

the chassis fits into the cabinet. In the completed rig, the chassis is mounted vertically with the power transformer at the bottom.

Rows of $\frac{1}{4}$ -inch diameter holes should be made. One row on each bottom side and four rows over the r.f. section will prove sufficient.

Testing

After the transmitter is wired, the r.f. section can be connected to the power supply with P_1 . For initial testing, an 80-meter crystal should be

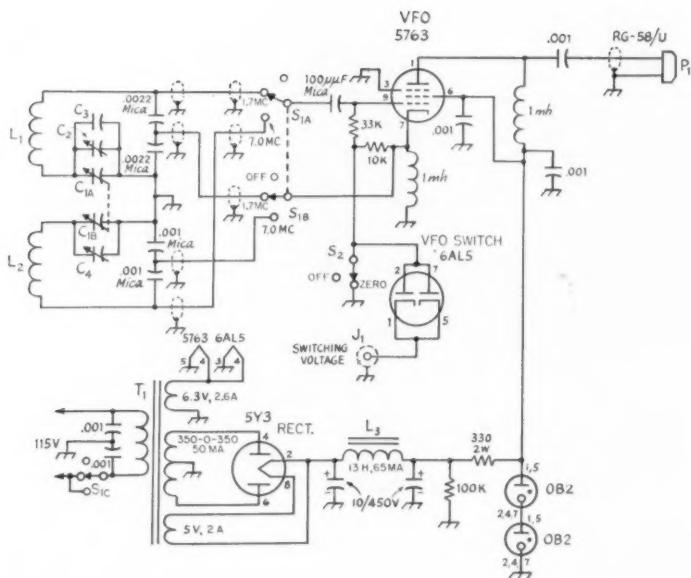


Fig. 3 — Circuit diagram of the VFO. All capacitances given in microfarads unless otherwise specified.

C₁ — C_{1A}, 9-plate midget variable; C_{1B}, 2-plate midget variable. (C_{1A}-C_{1B} is made by cutting down a Millen 21100). (See text).

C₂ — 50- μ uf. midget variable (Millen 26050).

C₃ — 47- μ uf. silver mica.

C₄ — 100- μ uf. midget variable (Millen 26100).

L₁ — 81 turns No. 24, 1-inch diam., 2 $\frac{1}{2}$ inches long (B & W 3016).

L₂ — 25 turns No. 20, 1-inch diam., 1 $\frac{1}{2}$ inches long (B & W 3015).

L₃ — 13 henrys 65 ma. (Stancor C-1708).

S₁ — Three-pole 3-position 2-section switch (Centralab sections PA-12, PA-2, index assembly PA-300).

S₂ — Single-pole 6-position (Central PA-2001).

T₁ — 350 v. each side of c.t., 50 ma., 6.3 v. 2.6 amp., 5 v. 2 amp. (Merit P-3160).

used. A 100-watt light bulb can be used for a dummy load. The operate switch S₆ is turned to c.w. and S₂ is set at "test." Leave the key open, turn on S₇, and allow the 6X5s to warm up. After the 6X5s are heated, close S₆. Switch the meter to read grid current and the bandswitch to the 80-meter band. For 80-meter operation, the oscillator plate is left untuned. Close the key

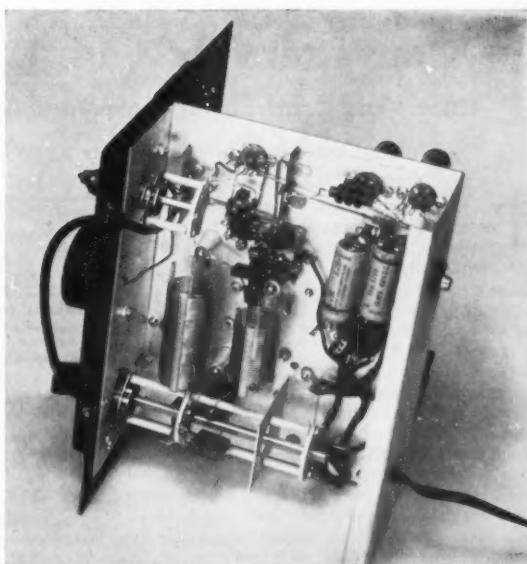
and tune the 6146 grid circuit. (With C₄ at minimum capacity, the grid circuit tunes to 40 meters. As the capacity is increased, 10 meters comes first, then 15, then 80, and at maximum, 20 meters.)

Tune the 6146 grid circuit to the 80-meter point and adjust the drive control for about 2 $\frac{1}{2}$ ma. grid current. Open the key, switch S₂ to c.w.,



Top view of the VFO showing the mounting of the tuning and handset capacitors. The handset capacitors are mounted on a U-shaped bracket. The shaft ends of the handset capacitors are slotted with a saw to accommodate an insulated screwdriver for adjustment.

Bottom view of the VFO. The 160-meter coil is at the left and the 40-meter inductance at the right. The coax leads from S_1 to the tube socket are visible between the two coils.



and reduce the output control to minimum. With the meter reading plate current, close the key and advance the output control, meanwhile tuning the 6146 plate capacitor for a dip. The fine and coarse loading controls will have to be adjusted as the rig is loaded up. It will be found that a large amount of capacitance is needed for 80 meters and progressively less for 40, 20, 15, and 10.

With the exception of 15 and 10, the same tuning procedure is followed with the other bands. On 10 and 15, the oscillator plate circuit is switched to tune 40 meters.

For phone operation it is only necessary to switch S_2 to phone and then use S_3 for the operate switch. The 6146 should not be loaded to more than 60 watts input for phone operation. The modulator resting current should be between 30 to 40 ma. and rise to approximately 120 ma. on peaks. Loading of the amplifier should be adjusted so that 60 watts input is achieved with the 25K output control full on. The grid drive is adjusted to give about $2\frac{1}{2}$ ma. on either phone or c.w. For c.w. operation, the amplifier can be run at 90 watts input. Although it exceeds the manufacturer's ratings, the 6146 was operated at about 110 watts input for extended periods without apparent damage to the tube.

The voltages on the various stages with the 6146 loaded to 150 ma. and the output control full on are as follows: oscillator and buffer-multiplier plates, 290; screen, 240; amplifier plate, 590; screen, 160. In the key-up condition all three screens should read approximately - 120 volts.

VFO Construction

The circuit diagram for the VFO is given in Fig. 3. With the exception of the 6AL5 switch, the VFO is the conventional Clapp circuit tuned to either 160 or 40. The 160-meter circuit furnishes adequate bandspread for 80- and 40-

meter tuning, while the 40-meter range takes care of 20, 15, and 10.

The unit is housed in a $7 \times 8 \times 10$ -inch steel cabinet. However, the builder can use any size adequate to hold the VFO. It must be remembered that TVI is just as much a problem with a VFO as with the transmitter it is feeding, so the housing should be sealed for r.f.

The tuning capacitor C_1 is made by modifying a Millen 21100 unit. Counting from the rear of the capacitor, the 3rd, 4th, and 5th stator plates are removed. This is accomplished by bending the plates back and forth until they are loosened on their support rods. After the plates are removed, the rear two stator plates are disconnected from the front plates by cutting both the stator bars with a hacksaw blade.

Though the circuit diagram shows one side of C_1 , C_2 , C_3 , and C_4 grounded, in the actual construction they are insulated from the chassis and a common ground bus connects all the points together. The leads from L_1 and L_2 to the switch are run in RG-58/U 52-ohm coax and the ends of the coax outer conductors near the tube socket are the common ground point for the bus from the capacitors.

The transmitter and VFO shown in the photographs was completed several months ago and given a thorough on-the-air testing. In the first version it was found that the 10-meter coil of the pi network, which was made up from the same type coil stock as the low-frequency inductance, heated up and softened the polystyrene support bars. This was corrected by substituting the present coil. The rig was used both as an individual transmitter and then as a driver for a higher-power triode amplifier. In both cases it has proved to be worth its salt as a flexible unit.

Converters for 7, 14, 21 and 28 Mc.

Circuit and Construction Considerations in Converter Design

LAIRD CAMPBELL, W1CUT, AND BYRON GOODMAN, W1DX

THE CRYSTAL-CONTROLLED CONVERTERS to be described were designed to be used ahead of a receiving system that will tune 3.5 to 4.0 Mc., on the assumption that one has or can acquire a receiver that is satisfactory in this range but may deteriorate at the higher frequencies. We decided against a single switched unit in favor of individual converters, despite the necessary duplication of tubes and components in this approach. Our reasoning took the line that this way they would be simpler to build and service, and also many readers might be interested in single-band converters. Another objective was best usable performance. By this we mean not the lowest possible noise figure, but a noise figure that was good enough for practically any location. When you get down far enough, improving the noise figure doesn't help reception very much, because the noise on the band is the limiting factor, not the receiver noise. In the interests of excellent image rejection and minimum cross modulation, we used manually tuned r.f. circuits instead of bandpass circuits. This does require peaking the circuits as one tunes a band, something that might be considered an inconvenience by some but not by us. Lastly, we decided to include adjustable antenna coupling, to facilitate matching to the antenna and also to extend the signal-handling capability.

If you are unfamiliar with the principle of a crystal-controlled converter, it doesn't take long to catch up. It is like any converter in that it consists of a mixer and an oscillator (and preferably an r.f. stage ahead of the mixer). It differs from a tunable converter in that the oscillator frequency is fixed (and crystal-controlled for maximum stability). Consequently a portion of the radio spectrum is shifted to another portion, and by tuning across this second portion one

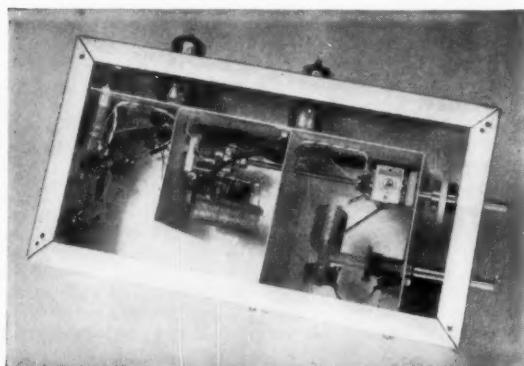
- Probably the easiest way to improve the high-frequency performance of a satisfactory low-frequency receiver is to add a crystal-controlled converter at the front end. Here is a circuit and some ideas for just such converters.

hears the signals in the first. To give an example: we wish to shift the 14.0- to 14.35-Mc. band to 80 meters. If the grid circuit of the mixer accepts the 14.0- to 14.35-Mc. signals, beating a 10.5-Mc. signal against them will shift them to 3.5 to 3.85 Mc. (14.0 - 10.5 = 3.5, 14.35 - 10.5 = 3.85, etc.). Thus if we use our 80-meter receiver in the output of the mixer, tuning 3.5 to 3.85 will enable us to hear the signals at 14.0 to 14.35 Mc. Of course signals between 7.0 (10.5 - 7.0 = 3.5) and 6.65 (10.5 - 6.65 = 3.85) could also be heard if the input circuit of the mixer didn't discriminate against them, and the oscillator harmonics (21.0, 31.5, etc.) might also bring in unwanted signals if the input discrimination weren't adequate. However, there is no problem if the input selectivity is good. The big advantage of the crystal-controlled converter is that the resultant stability and tuning rate is the same as you get with the 80-meter receiver. Anyone who has nursed a receiver along on 21 and 28 Mc. (and even 14) can appreciate the advantages.

Since the resultant combination is a double-conversion receiver with a first i.f. of around 3.5 Mc., image problems at these higher frequencies practically disappear.

The Circuit

With two exceptions, the circuits for these converters are the same, differing only in the



A 7-Mc. crystal-controlled converter. The two shafts extending to the right are (lower) adjustable antenna coupling and (upper) signal-circuit tuning. The crystal holder is the dark object in the center section, just behind the coils.

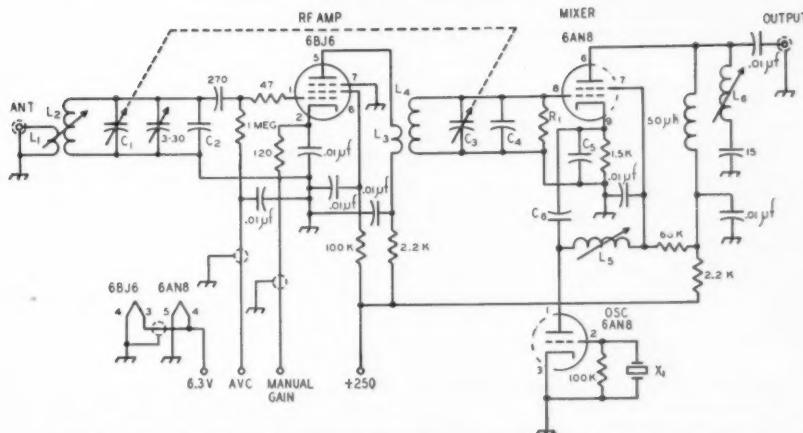


Fig. 1.—Schematic diagram of a crystal-controlled converter. The plate trap, L_6 and the $15-\mu\text{uf}$. capacitor, is used only in the 7-Mc. converter. The 10-meter converter uses two crystals, switched by a s.p.d.t. rotary in the "cold" lead from chassis ground.

All fixed capacitors are ceramic; all resistors are $\frac{1}{2}$ -watt.

C_1, C_2 — 25 μ uf. midget variable (Hammarlund MAPC-35-B with 2 rotor and 2 stator plates removed). L_6 — 105-200 μ h. (North Hills Electric 120-H). X_1 — See Table I (International Crystal, Type FA-9).

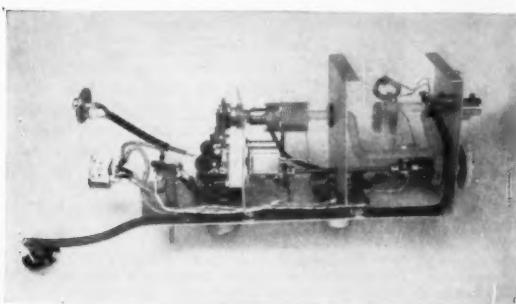
tuning range of the signal circuits and the frequency of the crystal. The exceptions can be found in the 7- and 28-Mc. converters. In the former, the 3400-ke. crystal is fairly close to one limit of the mixer output range, so a trap was added to attenuate the 3400-ke. signal that appears in the mixer output and might tend to overload the following receiver. The other exception can be found in the 28-Mc. unit, where a switch and additional crystal were added to permit covering the 27-Mc. band. It would not be necessary if the following receiver can tune as low as 2.5 Mc., and could be omitted in such a case.

The basic circuit is shown in Fig. 1, with the mixer plate-circuit trap (L_6 and $15 \mu\text{f}$.) in place but not the s.p.d.t. crystal switch for the highest-frequency converter. Following the adjustable coupling between L_1 and L_2 , the signal goes to the 6BJ6 r.f. amplifier and then to a second inductively-coupled circuit and to the grid of the mixer. The mixer is the pentode section of a 6ANS8; the crystal oscillator is the triode section of the 6ANS8, and part of its output is applied to

the mixer cathode via a capacitance divider, C_5C_6 . By using the high-frequency crystals made by International Crystal Mfg. Co., no fancy overtone oscillator circuit is required. Since the 1500-ohm cathode resistor of the mixer is the load for the oscillator, the capacitance divider, C_5C_6 , is required to avoid overloading the oscillator circuit and consequent non-oscillation. In the oscillator in the 10/11 meter converter, a single setting of the oscillator coil, L_5 , suffices for the two crystals. In the r.f. stage, provision is included for introducing a.v.c. voltage as well as manually-controlled cathode bias.

Construction

Although there are many ways one could lay out a converter, we elected to build these on little sub-assemblies that could be fitted into a $5 \times 9\frac{1}{2} \times 3$ -inch chassis that was to form the shielding case for the unit. In the design, particular attention was paid to see that the chassis grounds for the r.f. stage were all at one point, next to the socket. Since rather large diameter (for receivers) high-Q coils were to be used, a shield was used



The 10-11-meter converter removed from its case. The Lucite "crank-shaft" for switching crystals can be seen in the right-hand compartment.

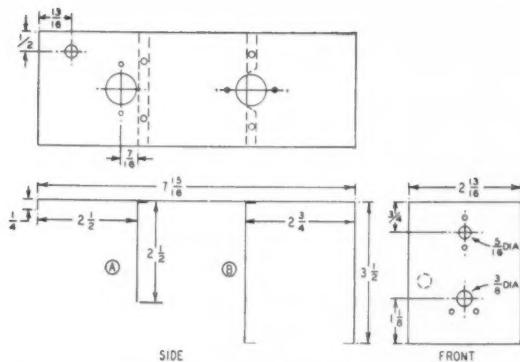


Fig. 2 — Details of the sub-chassis and partitions. The bottom lips of the front and of piece B rest on $\frac{1}{4}$ -inch bars at the bottom.

between them, straddling the 6BJ6 socket. The tuning capacitors, C_1 and C_2 , were ganged mechanically by a length of $\frac{1}{8}$ -inch diameter rod and two of the Miller M008 miniaturized shaft couplings. The only capacitors we could find with $\frac{1}{8}$ -inch shafts were the Hammarlund MAPC-B. The $\frac{1}{8}$ -inch shafts extend to the rear of these capacitors; the front portion is the standard $\frac{1}{4}$ -inch diameter. To make room for the couplers, two rotor and two stators were removed from each MAPC-35-B $35-\mu\text{f}$. variable.

Dimensions for the sub-chassis are shown in Fig. 2, as well as the locations of most of the holes. Partitions A and B are held to the chassis by 6-32 hardware; partition A has mounting holes for the variable capacitor similar to those in the front view except that the two small holes are on the horizontal center line. Partition A also carries the crystal socket and two clearance holes for the stator and rotor leads from the variable capacitor. Partition B has a clearance hole for the variable capacitor shaft. The dashed hole on the front view is for the crystal switch shaft on the 10-meter converter; this switch mounts on partition A and is turned by the Lucite "crankshaft" shown in one of the photographs. While this crankshaft may look like something out of Rube

Goldberg, actually it is a simple matter to soften a length of $\frac{1}{4}$ -inch diameter Lucite rod by rolling it on a soldering iron. When it is suitably soft, it is then bent and held in position until cool. The insulating crankshaft was used to escape running metal near or through the coil — the principle might come in handy in some other designs if you don't mind a few jeers from self-styled humorists. As mentioned earlier, it isn't necessary to switch crystals if the tuning range of the receiver following the converter includes 2.5 Mc.

The only other constructional Goldberg is the variable antenna coupling. This is made by running a piece of $\frac{1}{4}$ -inch Lucite rod through a shaft bushing and using a rubber grommet between fiber washers as a friction lock. A screw through the shaft serves as a stop for the washer on one side of the grommet, and the shaft bearing serves as the stop on the other. Compression is maintained by using a solid shaft coupler on the other side of the bearing. Using a long set-screw on the solid shaft coupler provides an arm that can hit either of two stops (small screws) and thus limits the travel of the coil.

In wiring a unit, shielded wire was used for the heater and d.c. leads that ran past partition A up toward the r.f. stage. The antenna lead was a

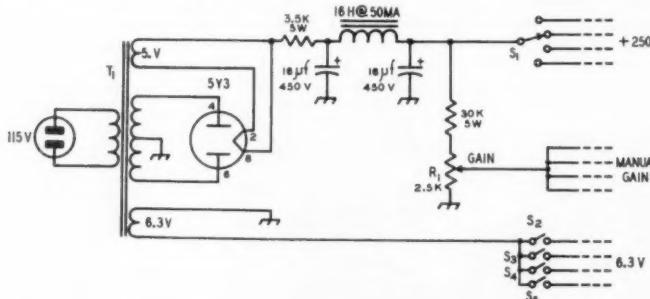


Fig. 3—Schematic of a power supply for the crystal-controlled converters. If the power supply is to be used with only one converter, the switches can be eliminated from the circuit.

R_1 = Wirewound potentiometer (JRC WK2500).

S₁ — 2-section 4-pole rotary switch. Sections not shown switch antenna inputs and converter outputs through coaxial line. (Centralab PA-2045, one

pole not used).

pole not used).
L₁ — Replacement-type choke (Knight 62 G 137).
T₁ — Replacement-type transformer 325-0-325 v.
(Knight 62 G 042).

TABLE I
Component Values for the Crystal-Controlled Converters

Band	L_1	L_2, L_4	L_3	L_5	C_2	C_4	C_5	C_6	R_1	X_1
7 Mc.	12t ¹	28t ¹	18t ¹	9-16 μ h (120-D) ³	25 μ uf	50 μ uf	1500 μ uf	150 μ uf	47K	3.4 Mc.
14	5t ²	19t ²	15t ¹	3-5 μ h (120-B) ³	15 μ uf	25 μ uf	330 μ uf	33 μ uf	27K	10.5 Mc.
21	12t ¹	17t ²	15t ¹	2-3 μ h (120-A) ³	—	—	330 μ uf	33 μ uf	33K	17.5 Mc.
28	8t ¹	10t ²	10t ¹	2-3 μ h (120-A) ³	—	—	150 μ uf	15 μ uf	18K	11 meters: 23.4 Mc. 10 meters: 24.5 Mc.

¹ 32 t.p.i. No. 24, $\frac{1}{2}$ -inch diam. (B & W 3008)

² 16 t.p.i. No. 18, $\frac{1}{2}$ -inch diam. (B & W 3011)

³ North Hills Electric Co. designation

length of RG-59/U coaxial cable. Input and output connections were brought to phono jacks at the rear of the unit; power and control leads were terminated in a Cinch-Jones P-304-AB plug.

Coils L_2 and L_4 are supported by No. 14 wire leads extending from the tuning capacitors. The B+ end of L_3 is cemented to the ground end of L_4 with Duco or Ambroid cement. This gives an improvement in minimizing spurious responses over that obtainable by sliding a larger-diameter L_3 over L_4 , but on the two lower-frequency ranges it requires the use of padding capacitors, C_2 and C_4 , because otherwise the L_3L_4 assembly becomes too long. The 3- to 30- μ uf. compression capacitor across C_1 is mounted on the terminals of the variable capacitor.

Adjustment

The first step in checking a converter, after the wiring has been checked and a power supply and receiver have been connected, is to check the oscillator and mixer. With only the 6AN8 in its socket, turn on the power and look around the crystal frequency with your receiver to see if the crystal oscillator is working. If it isn't, tune L_5 until it does. Then put the receiver in the range 3.5 to 4.0 Mc. and tune C_1 C_3 . At some setting you should hear an increase in noise, indicating that the mixer input circuit is tuned to resonance. If the increase in noise is quite sharp, it indicates regeneration in the mixer, and the value of R_1 (Table I) should be reduced. This mixer-oscillator combination is basically regenerative, and with R_1 removed the mixer will oscillate.

Under normal operation of the mixer and oscillator, the voltage at Pin 7 will run around 50 to 60 volts, and around 3 volts at Pin 9.

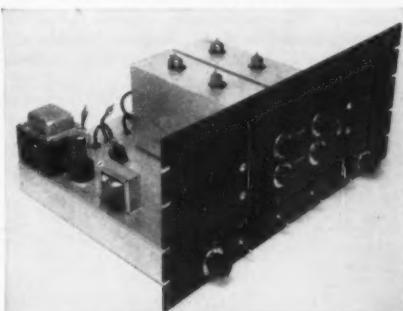
Leave the ganged capacitors C_1 and C_3 at the setting that gave the noise peak, connect a 2500-ohm wirewound potentiometer in the manual gain circuit to chassis ground, short the AVC connection to chassis, and plug in the 6BJ6. Connect an antenna and, with the gain control at maximum gain (minimum resistance), adjust the compression trimmer across C_1 for maximum noise. The two circuits are now tracking and should tune together over the band. Tuning 3.5 to 4.0 Mc. with the receiver should now bring in signals from the band for which the converter is de-

signed. Loosening the antenna coupling by swinging L_1 away from L_2 should reduce the strength of incoming signals. If it doesn't, or if the sharpness of C_1C_3 tuning changes with the gain-control setting, it indicates that the r.f. stage is regenerative. Since the mixer can be regenerative, as mentioned above, it is necessary to be able to isolate the two causes of sharp tuning. In either case the cure is to decrease the value of R_1 . You shouldn't have any trouble, however, if the stage grounds are brought to one point on the chassis, as mentioned earlier.

When the converter is working properly, shorting either side of the 270- μ uf. capacitor to chassis with a screwdriver should reduce the noise output of the converter to a low value, when the manual gain control is set at minimum resistance. To get a wide range of gain control from the 2500-ohm gain control, a bleed current of 8 or 9 ma. should pass through it. A typical power supply and gain-control circuit is shown in Fig. 3.

If several converters are built and used, an arrangement similar to that shown in one of the photographs will be convenient. Here the several converters are mounted on a 13 \times 17 \times 2-inch chassis, and the power supply is mounted along one side. The input, output and power circuits make up to each converter at the rear, through phono plugs and Cinch-Jones connectors. Toggle

(Continued on page 132)



Several crystal-controlled converters can be installed on a chassis with a common power supply. Here the 20- and 15-meter converters are shown in place. On the panel, the lower left-hand knob is the common gain control, and the right-hand knob controls the switch that selects the converter to be used. The toggle switches control the heater circuits separately.

An Accessible Antenna Tower

Using the House as a Permanent Gin Pole

BY HERMAN LUKOFF,* W3HTF

• Here is the way to use lightweight tower material for a rotary beam and still be able to adjust the elements when necessary. It may furnish an answer for your antenna problem.

ONE of the foremost requirements I had in looking for a new house was that it have a flat roof for easy antenna access. Therefore, it wasn't too surprising when I wound up with a peaked roof house which old "yellow-bellied" W3HTF was simply too afraid to climb. At one time climbing a 100-foot mast to repair a radar antenna was part of the day's job, but since then the responsibilities of family life have induced a new era of conservatism. Yet that beam antenna had to be put up somehow!

The first attempt at putting up my midget 20-meter beam involved an enormous amount of effort on the part of five men pulling and tugging at guy wires for hours. The 2 by 3s used as a mast acted more like a snake than pieces of wood. Nevertheless, it went up. It didn't take too long to discover that the beam was not working properly and required adjustment. At this point I was very discouraged with the whole project and rounded up five men to take the whole mess down again.

I firmly resolved not to put the beam back up until I had figured out a scheme whereby raising and lowering the antenna would be a one-man operation, solving once and for all the problems of adjustment, maintenance and future expansion.

Various types of towers on the market were examined for practicability. Most collapsible towers only lowered to 20 feet, which still presented a problem in reaching the elements



The tower in place against the house.

and another slightly down from the top of the mast. Half-inch weatherproofed rope is threaded through the pulleys with one end anchored at the top of the mast and the other brought to the window of the shack on the second floor level. Obviously, other pulley arrangements can be used to provide more or less mechanical advantage, but this scheme best fitted my condi-

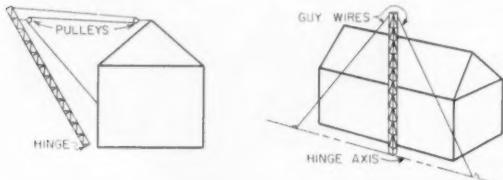


Fig. 1 — Two views of the basic principle of using the house as a permanent gin pole. The guy wires must not be interfered with in any position of the tower.

from the ground. Flop-over towers were expensive and could not be placed alongside the house.

I then considered the idea of using the house itself as a combination gin pole and guying element in conjunction with a rugged TV-type tower. The basic principle is shown in Fig. 1.

One pulley is placed at the peak of the roof

* 909 Glenview St., Philadelphia 11, Penna.

tions. The mast itself is hinged at the base through a large pin. Most TV tower companies sell the hinged base as an inexpensive accessory. Two guy wires are used from the top of the tower to any convenient point on a line along the axis of the hinge. The guy wires do not have to be symmetrically displaced about the hinge.

(Continued on page 114)

A Simple Code-Practice Oscillator

Novel Circuit for Battery or A. C. Operation

BY DAVID T. GEISER,* WIZEO

THE FIRST piece of equipment a beginner usually builds when he has finally made the decision to study for the amateur operator examination is a code-practice oscillator. The usual oscillator has at least one of several drawbacks: the theory is hard to understand, connections may be reversed, resulting in no operation, the tone may be shrill or varying, or there may be loud clicks on the key make and break. Cost is also a factor, and was considered in the design that follows.

How To Generate A Tone Electrically

A tone is the vibration of air at a fixed rate. It may be created by starting an electrical vibration and feeding the electricity to a pair of headphones which, in turn, make air vibrate at the

• In this simple code-practice oscillator, WIZEO uses a novel circuit that produces a tone of good quality with a minimum of key clicks. Very few components are required and values are not critical. The unit may also be used as a selective audio amplifier.

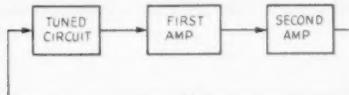


Fig. 1 — Block diagram of the simple code-practice oscillator showing how the signal travels through the circuit.

same rate. There are several ways to create electrical vibrations with parts that turn on and off, such as a door-bell buzzer or neon tube. It is also possible to turn on and off the current in a radio tube and get the same effect. These ways are called nonlinear methods and, strictly speaking, do not generate a tone like a good radio code signal, though they are quick and fairly good ways of obtaining a signal for code practice.

Radio tubes acting as amplifiers can generate very pure tones in special circuits where the current *circulates* through the amplifier and is fed from the amplifier output back into the input cir-

cuit at the proper time to reinforce itself. Thus a succession of waves is created which may also be used to feed the headphones and produce a tone. Usually it is desirable to regulate, in some fashion, the way the waves build up and decrease and this is done by tuning. The equipment described uses two amplifiers and a tuned circuit.

How the Oscillator Works

The block diagram (Fig. 1) shows two amplifier stages with the output of the first stage feeding the second stage directly, and the second output feeding a tuned circuit and the input of the first stage. As each amplifier reverses the signal coming into it, the second output is a much amplified duplicate of the first input signal. The tuned circuit helps prevent the generation of any tone but the desired one.

Electrical tuned circuits in the audible range are usually expensive, but *mechanical* tuned circuits are cheap. Simple examples of mechanical tuning are seen in the violin string or a bell or tuning fork. Even the thin metal diaphragm of a headphone shows such tuning effects, so the headphone is used here as a tuned circuit combining mechanical tuning with electrical connections where the effects of the mechanical tuning appear electrical. Thus the headphone is used two ways, both as a tuning part and a device to convert

* 275 Kemp Ave., North Adams, Mass.

The author operating the battery model of the simple code-practice oscillator.



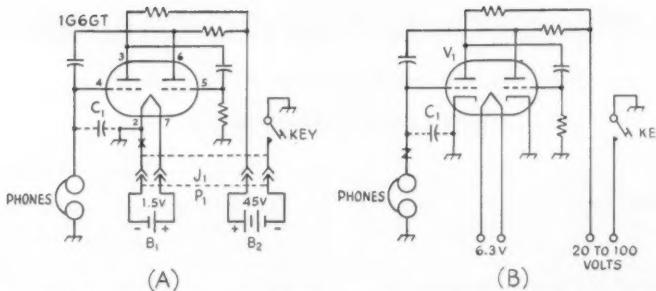


Fig. 2 — Circuits for the simple code-practice oscillator. A — Battery-tube circuit. B — Circuit for cathode-type tubes. In A, all resistors are 100K, $\frac{1}{2}$ watt, and all capacitors 0.047 μ f., 200 volts (Sprague 2TM-S47). C_1 may or may not be needed as explained in the text. An on-off switch may be inserted at "X." See text for a discussion of J_1 and P_1 .

In the circuit of B, any pair of triodes or a dual triode having an amplification factor of 15 to 100 may be used. Resistors may be between 20K and 100K, $\frac{1}{2}$ watt. Capacitors may have values between 0.01 μ f. and 0.047 μ f., 200 to 600 volts. (See text.) With some types of headphones, a resistor of from 3.9K to 10K may be inserted at "Z" for best results. C_1 performs the same function as C_1 in circuit A.

electrical waves into sound. Cheap magnetic headphones are ideal for this use. Peculiarly, the more "high-fidelity" a headphone is, the less suitable it should be in this circuit.

All tone generators require power and the usual way to start or stop the tone has been to turn the power on and off going to the plates of the tube. As the headphone has commonly been placed in this lead, the power switching has produced loud clicks in the headphones which are usually quite startling to the newcomer and are not representative of a good code signal. Here (Fig. 2) two tubes (in a single envelope) are used and, the click being the same (approximately) in each tube, tends to cancel out because of the signal-reversing action of the amplifier. Any remaining tendency to click is eliminated by not having the headphones in the power lead.

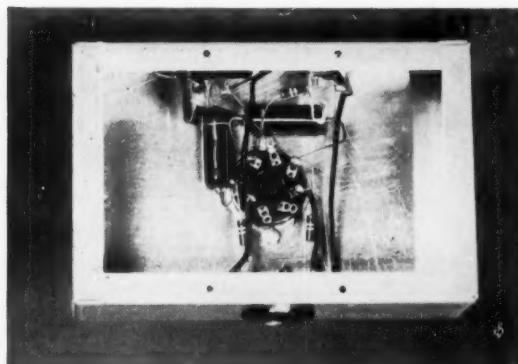
How To Build the Oscillator

The oscillator was designed so that only one value of each kind of part was needed. Thus, where the wiring calls for a resistor, any of the resistors purchased may be used; likewise with the capacitors. Sizes and ratings have been chosen for least cost and size. Any voltage or

wattage ratings higher than those specified for the parts are quite all right, but they will cost more and occupy more space.

The 1G6GT tube was chosen for the battery circuit of Fig. 2A since its pin connections make wiring errors almost impossible. The octal-tube base is keyed and each half of the pins on either side of the key bit connect to an identical "tube," for there are two "tubes" within the 1G6GT envelope. Thus, whether one is accustomed to wiring "from the top," or, as is more conventional, "from the bottom" of the socket, the oscillator should work the first time. (The wiring shown will also allow the use of the 2-volt-filament 1J6GT tube or, by adding the cathode connection at Pin 8, the 6.3-volt-filament 6N7 series tubes. "Series" means such as the 6N7, 6N7G, and 6N7GT, all of which are equivalent in this application.)

Make the connections as shown in Fig. 2. Carefully wrap each lead around the proper terminal tightly and solder, being careful not to let a blob of solder form, shorting terminals together. Binding posts or other connections may be used for the batteries and key, but the writer prefers the connections shown as it is then



Bottom view of the simple code-practice oscillator. The components are assembled on a 2 \times 4 \times 6-inch aluminum chassis. In this model, battery connections are made through the octal socket at the rear, while jacks are provided at the front for key and headphones.

impossible to burn out the tube by connecting the wrong battery to the tube filament. Plug the battery connectors in after the headphones are connected and then plug in the tube. Pressing the key should result in a clean steady tone. Should there be any doubt whether connections are correct to the batteries, before plugging in the tube, connect a common 2-cell flashlight bulb to the two socket connections that are *second* from the key bit. The bulb should glow dimly. If there is no light, a wiring error has been committed. If the light comes on bright and flashes out, the wrong battery has been connected. That way the test costs a flashlight bulb instead of a tube.

Please note that the arm of the key is connected to the "common" or chassis ground lead.

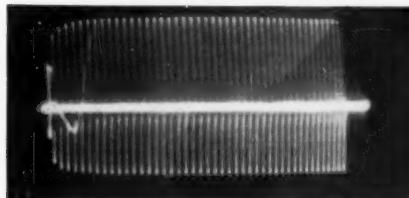


Fig. 3 — Oscillator keying and wave form.

This way there is no exposed voltage the user may come in contact with in normal operation. (There is no lethal voltage in the equipment.) The oscillator does not need a chassis to work properly; just the parts, properly connected, work fine lying on the top of a table (wooden or plastic, of course).

The reader, if he wishes, may install an on-off switch at the point marked "X" in Fig. 2. The writer considers this an unnecessary expense as the low temperature of the 1G6GT makes pulling out the tube a quite practical (and cheap!!) way of turning the oscillator off.

The capacitor, C_1 , shown connected with dashed lines stabilizes the oscillator if the headphones fit poorly, as the air between the ear and the headphones forms part of the mechanical tuning circuit. The capacitor effectively closes this air chamber and thus may not always be necessary.

The photographs show the first of these oscillators constructed. A telephone jack was used instead of the phone tip jacks, since the writer uses most often surplus headphones having telephone plugs. The oscillator has been tested with headphones having impedances of 8000, 4000, 2000, 1000, and 600 ohms and in each case has worked satisfactorily. Only one type of headphone has been found unsuitable for the oscillator, the Brandes Type 10A/3038. Insertion of a small resistor in series with the headphones will permit oscillation with this and similar phones.

Fig. 3 is a photograph of the wave produced by the oscillator. Two things are worth noting: there is a smooth start

and stop, and there is slight distortion in the wave. The smooth start and stop are typical of click-free operation while the distortion is just sufficient to keep the tone from being boring.

The recommended circuit for "cathode" tubes is shown in Fig. 2B. The latitude of permissible circuit values is quite wide, making "junk-box" construction easy. Generally, the 0.01-0.05- μ F. capacitors, when chosen near the high end of the range, yield more pleasing tones when the 20K-100K resistors lie toward the lower end of their range, and vice versa. A point worth remembering, if parts must be purchased, is that *smaller* values of capacitors are cheaper and, correspondingly, higher resistors permit less current drain and longer battery life.

Different tubes perform well in the circuit — the writer personally has used widely differing types such as the 6C5, 6J5, 6N7, 6SN7, 12AT7, 12AU7, and 12AX7. The reserve amplification available from these tubes operating zero bias will slightly roughen the tone, though not objectionably. Should one of these "cathode" tubes be chosen, the beginner is well advised to purchase a 6.3-volt filament transformer to save ultimately high filament battery cost.

Tricks with the Oscillator

The user may generate frequency-modulated audio by speaking into a headphone while the unit is oscillating. There isn't much deviation, but enough to be used as a demonstration on an oscilloscope or possibly enough for such purposes as telemetering.

The amateur will receive more use from the circuit of Fig. 4, where the oscillator is used to separate audio signals (such as radio code) close to the same tone. The regeneration control R_2 is set just below the point of regeneration and a tone coming from the receiver will key the oscillator if the received tone is very close to the oscillation frequency of the oscillator. The proper setting of the regeneration control is the point at which a 100 per cent increase of the input tone voltage triggers the oscillator. Used in this fashion, the desired tone only is effectively amplified about 20 db. (10 times the original voltage). The desired tone should have

(Continued on page 120)

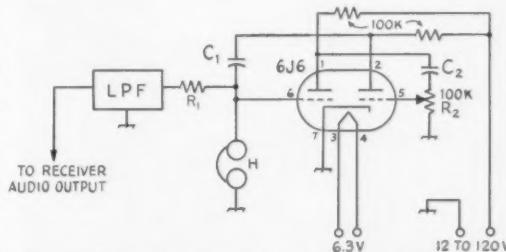


Fig. 4 — Circuit showing how the oscillator may be used as a selective audio amplifier. C_1 and C_2 may have values between 0.01 and 0.047 μ F. R_1 should have a value of about four times the headphone impedance (33K for the 8000-ohm headphones used). All resistors are $\frac{1}{2}$ watt. LPF is a low-pass filter to attenuate harmonics.

"Echoes" with Home Tape Recorders

Or, Two Heads Are Better Than One

BY GEORGE A. BOWLEY,* W1TQS

* On the assumption that a large number of amateurs own tape recorders and might be interested in how to obtain echo effects, here is a how-to-do-it story on how W1TQS modified his. The same principles apply to a variety of recorders.

YOU have perhaps noticed that, out of all the phonograph records on the market today, the most popular records achieve their popularity because they contain either an unusual arrangement of a song, an odd instrument, or an electronic gimmick. In other words, they all have something to catch the listener's ear and make them stand out above others. Like, for instance, Les Paul and Mary Ford with their multiple recorded guitars and voices.

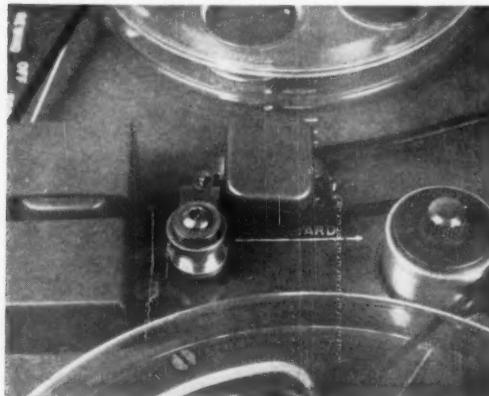
Generally an echo is produced by one of three methods. First, by the use of a room with highly reverberant walls, commonly known as an echo chamber. This chamber creates the effect of hollowness and space but, because of its massive size and cost, it is quite improbable that the average ham could afford to use it. The second method of echo generation is by the use of coiled springs immersed in oil to delay the sound mechanically. This set-up creates an effect similar to the echo chamber, and is an intricate piece of apparatus. The third method, and the one with which we will deal here, is the echo produced by a tape recorder. This effect is heard often on space-opera programs and TV advertisements, and it is the basic component of many commercial recordings.

Fig. 1 shows the basic layout of the tape-

recorded echo. The system requires two tape heads: one "Record" and one "Playback." A microphone is connected to an audio mixer which is, in turn, connected to the input of a recorder. The voice is recorded on the tape by recording head *A*. The sound just recorded travels by tape to playback head *B* where it is picked up and fed back through the mixer. This causes the sound to be re-recorded, and the entire process continues over and over until the decay of the system attenuates the echo to zero. The result is a steady repetition of any sound that enters the microphone. This arrangement of separate record and playback heads is standard equipment on machines like Ampex and Concertone, and an echo is achieved quite easily. But the average tape recorder in the \$100-\$200 class contains only one tape head. Since this performs both functions, it is impossible to record and play back at the same time. This is the main reason why most tape-recorder owners can't generate echoes. Not many of us can afford an Ampex.

Home recorders can be converted very easily to produce quite a professional-sounding echo. The first thing that is needed is an extra tape head. The Shure No. 816 head is preferable in this application because it has high impedance and can be fed directly into the microphone input of the recorder. Also, the price is lower because it does not contain an erase magnet. (Erasing is not necessary since only playback is involved.) This head should be mounted somewhere between the recording head on the recorder and the take-up reel — the closer to the recording head, the better. Almost any tape recorder has space enough, but the method of mounting may differ with various models. The head may be mounted by your own ingenious arrangement of

* 12 Center St., Provincetown, Mass.



A close-up view of the recorder at W1TQS, showing how the auxiliary head is mounted.

brackets and, if worse comes to worse, you can even use adhesive tape. The guidepost on the Bell tape recorder provides an excellent mounting place, as shown in the photograph. A little ingenuity will probably be necessary. Usually,

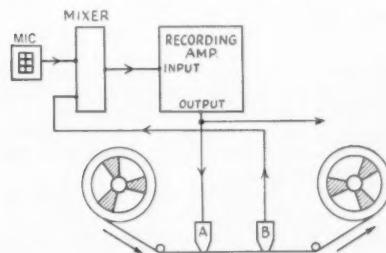


Fig. 1 — The "echo" is obtained by picking up the recorded voice from the tape through head *B* and reintroducing it at the input of the recording amplifier. Echo time is determined by the head spacing and tape speed, and the number of echoes is controlled by the gain through the *B* head circuit.

great care is exercised in mounting a tape head so that the head and tape meet at certain angles to prevent wear and distortion, but with the little space available, it is almost impossible to meet these conditions. All that is required in this application is that the head touch the tape and is perpendicular to it.

Once the head is mounted on the recorder, the only other consideration is the mixer. Fig. 2A shows a simple mixer. Two audio signals are fed through J_1 and J_2 . The resulting output at P_1 is a combination of the two signals. R_1 and R_2 serve as isolation resistors, and prevent one circuit

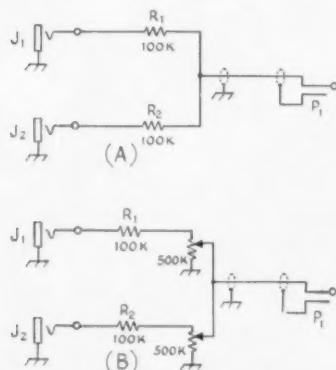


Fig. 2 — Two simple mixer circuits. *B* is preferable because relative gains can be controlled easily.

from shorting out, or dominating the other circuit. This effect is called "interaction" and is quite technical to explain. Satisfactory mixing action can be accomplished by this circuit, but that of Fig. 2B is more suitable because the gain of each input can be varied. In this way, the decay (number of echoes) can be controlled, thus preventing the level of the reflected sound from

becoming higher than the microphone level, which would cause a mechanical sounding type of feed-back becoming louder and louder with each reverberation.

With the microphone and the playback head connected to the mixer, and the mixer plugged into the microphone input of the recorder, the system is now ready to produce an echo. First of all, set the volume control on the recorder to maximum. Next, set the machine to the "record" position. Speak into the microphone and adjust the gain on the mixer to the point where the neon light, VU meter, or magic eye indicates normal recording level. Then set the tape in motion, and turn up the playback head gain on the mixer until an echo is heard. Adjust the playback head against the tape until the clearest and loudest echo is obtained. To prevent feed-back it is best to monitor the operation with headphones instead of a speaker.

By simply varying the head gain on the mixer the amount of reverberation can be controlled. With the gain low, the voice will come back only once or twice. With the gain high, as many as twenty-five reverberations are possible.

The speed of the echo depends on the tape speed and the distance between the two heads. When the playback head is one inch from the recording head, and the tape is running at 3 1/4 i.p.s., the echo will come back at the rate of 3 1/4 times per second. At 7 1/2 i.p.s., the rate is doubled. As a rule, the faster the echo, the more pleasing it sounds.

Practical Hints

A few hints concerning the echo. First, the owners of Pentron tape recorders will have to mount their playback heads in a slightly different manner. Since on a Pentron the take-up and feed reels are exactly opposite from the standard arrangement, the Pentron recording head records on the bottom half of the tape instead of recording on the upper half (high track recording). Therefore, the playback head will have to be mounted upside down, in order to pick up the sound that was recorded on the tape. Secondly, those who are fortunate enough to own an Ampex or Concertone, or even certain models of Magna-Corders, can achieve an echo without the addition of a separate playback head. These recorders have the facility to monitor the tape through a head already incorporated in the machine. Just feed this special monitor signal back into the input using the described mixer, and the same result is obtained.

COMING A.R.R.L. CONVENTIONS

- March 3 — Michigan State, Grand Rapids
- June 15-16-17 — West Gulf Division, Galveston, Texas
- July 6-7-8 — ARRL National Convention, San Francisco, Calif.

The Ash-Tray Mobile

Inconspicuous Dashboard Mounting

BY DEAN F. PFOST,* W7KOT

• Faced with the problem of overcoming objections to the appearance and hazards of the usual mobile installation, W7KOT came up with the idea of using the ash-receiver space. He found that in most of the later-model cars sufficient space may be found for a one-band 2E26 rig.

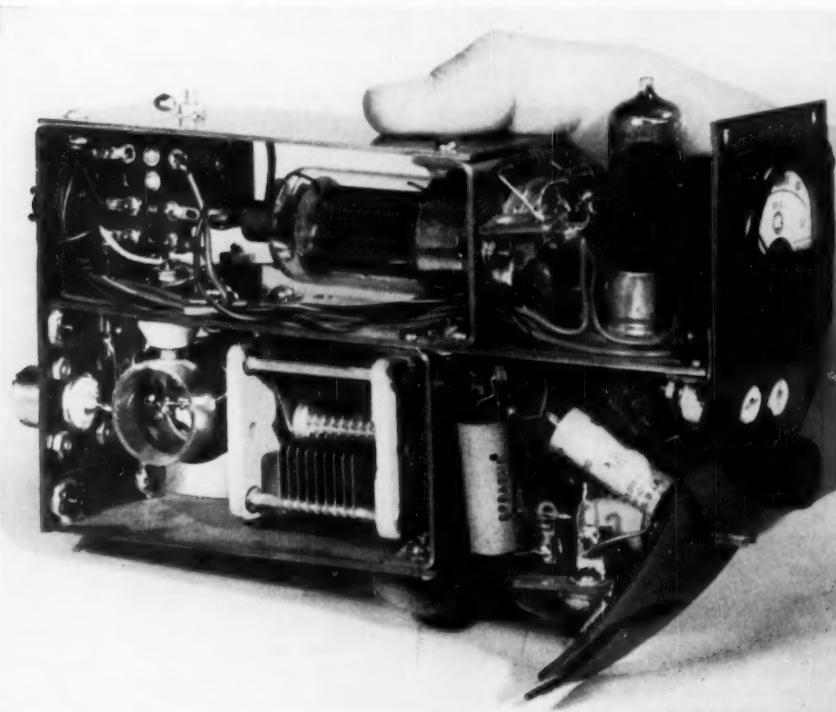
I, W7KOT, of Idaho Falls, Idaho, having all my life wanted a mobile rig in the family car, finally timidly approached the XYL, and proposed installing one of the popular manufactured transmitters under the dash of our 1955 Chevrolet station wagon. The reply was not entirely unexpected and went something like this: "I will

* 238 West 20th St., Idaho Falls, Id.

not stand for that pile of junk hanging all over the car for me to snag my stockings on, and for the children to fall against and hurt themselves. Besides, it looks messy and it is embarrassing to explain its necessity to my friends each time we meet in our car."

This edict did not discourage me, however. I still persisted that there must be some way to please my XYL and still have my mobile. A survey showed that most of the manufactured units were much too large to be mounted inconspicuously under or behind the dash. However, withdrawal of the ash receiver revealed a very convenient space, approximately 2 by 5 by 9 inches, into which it seemed probable that a single-band transmitter might be built. The finished product is shown in the photographs. Although the ash receivers in cars of other makes and models will vary in shape, almost all

A 25-watt 75-meter mobile rig built to fit a Chevrolet ash-receiver compartment. On the panel, below the meter, are the crystal socket, final tank-capacitor control and the slug-adjusting screw of L_1 . The oscillator tube is behind the meter, followed by the 2E26, mounted horizontally, and the relay. The output tank components are below.



of them will yield approximately equivalent space in one form or another. Since the cigarette lighter wasn't much good without the ash tray, I removed it also and replaced it with a microphone connector.

R.F. Circuit

The r.f. circuit is shown in Fig. 1. A 6AQ5 in a simple tetrode crystal oscillator driven a 2E26 amplifier. The output circuit of the oscillator is tuned by adjustment of the iron slug in L_1 . The adjusting screw is brought out through the panel so that it can be reached conveniently when changing crystals.

The 2E26 was chosen because it best fitted the limitations of the Mark II dynamotor which I had picked up. A 6146 will fit in about the same space. A control for the final tank capacitor was also brought out to the panel by means of an extension shaft. The panel affords space for a 1½-inch milliammeter which is not only indispensable in tuning the transmitter but which also adds to the appearance of the unit. A change-over relay is included which shifts the antenna between transmitter and receiver, and also turns the receiver B supply off while transmitting.

The panel is made of sheet brass or aluminum. It is cut and bent to fit the ash-receiver opening.

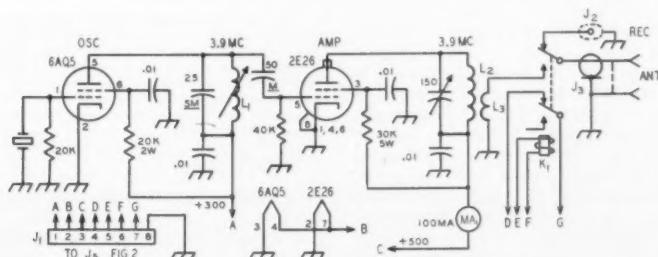


Fig. 1—Circuit of the r.f. section.

The 150- μ uf. amplifier tank capacitor is a Bud CE-2005 or similar. All capacitances less than 0.001 μ f. are in μ uf. All 0.01- μ f. capacitors are disk ceramic. M = mica. SM = silver mica. Unless otherwise specified, all resistors are $\frac{1}{2}$ -volt carbon composition. J_1 is a male octal connector. K_1 is a d.p.d.t. 12-volt change-over relay. MA_1 is a

of the ash-tray 80-meter transmitter.

Marion 1½-inch unit (Type HS-1)

$I_4 = 49$ turns No. 28 enam. on CTC LS-4

Li = 40 turns No. 20 chain, on CTC form, $\frac{1}{2}$ -inch diam. (approx. 35μ)

L_2 — 30 turns No. 20 enam., 1-inch diam.
 L_3 — 1 turn No. 20 enam., wound over ground end of
 L_1 (Scotch Electrical Tape between windings).

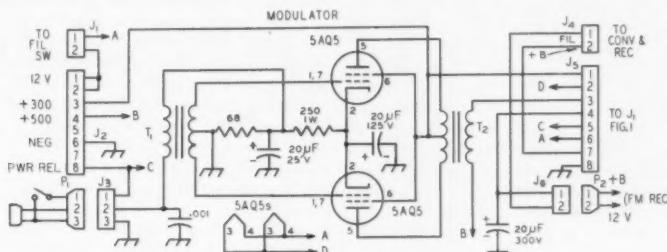


Fig. 2 — Circuit of the modulator for the ash-tray mobile rig, showing power and control cable connections.

J₁, J₄ = 2-terminal female connector.

J₂ = Male genital connector.

J4 = 3-terminal microphone connector.

J₅ — Female oesophageal connector.

J₈ — 2-terminal male connector.

T₁ — Microphone transformer, 1:84 (Peerless K-007X or equivalent).

To — Modulation transformer 10,000 to 8000 ohms

T_2 — Modulation transformer, 10,000 to 1000 ohms (Peerless M-913X or equivalent).

• Recent Equipment —

The Eldico SSB-100 Exciter/Transmitter

THE SSB-100 is a 100-watt peak envelope power s.s.b. transmitter, complete with power supply and VFO, that can also be used on a.m. and c.w. It occupies no more room than most receivers, since it is only $12\frac{1}{2}$ inches high by 21 wide by $13\frac{1}{2}$ deep. All you have to do with it is get on the air is plug in the power plug, connect a microphone and antenna and, of course, read the instruction book. It has a built-in monitoring oscilloscope, so you don't have to buy anything extra to be sure that you are tuned up properly.

Fig. 1, a block diagram of the SSB-100, tells a lot of the story. The microphone input is amplified in a 3-stage amplifier, the two sections of a 12AT7 and a 6C4. The output of the 6C4 is transformer-coupled to an audio phase-shift network, where the audio is split into two channels, differing in phase by 90 degrees. The output of these two channels is applied through half-12AU7 cathode followers to two balanced modulators using 1N60 germanium diodes. The r.f. applied to the balanced modulators is crystal-controlled at 8.15 Mc., and it is fed 90 degrees out of phase to the two balanced modulators. This basic "phasing" system for generating an s.s.b. signal is well-known, of course, to those who have followed such things. Out of the balanced modulators we have a single-sideband signal at a nominal-but-suppressed carrier frequency of 8.15 Mc. Which sideband is used (upper or lower) is determined by the position of a switch that reverses the cathode-follower outputs. For a.m. operation one of the balanced modulators is unbalanced and the other is switched out. Separate balancing potentiometers are used with the balanced modulators and for the a.m. position, and these are set up at the factory. The result is that the operator simply switches between a.m. and

s.s.b., without adjusting or readjusting controls. Further along this line, switching from s.s.b. to a.m. also modifies the gain of the 6C4 stage, and the operator doesn't have to dive for the audio



This rear view of the SSB-100 with the top and back removed shows the unit construction of this complete 100-watt s.s.b./a.m./c.w. transmitter. The audio and 8.15-Mc. s.s.b. generator are on the right-hand side, and the little one-tube stage riding above it is the 8.15-Mc. amplifier. Over on the left-hand side you can see the converter section in the foreground and the monitor scope section against the panel. In the center near the panel, the dark box is the low-pass filter in the output of the VFO stage.

gain control to avoid overloading amplifier stages later on.

The 8.15-Mc. s.s.b. (or a.m.) signal is amplified in a 12AT7, the first section connected as a grounded-grid amplifier and the second as a cathode follower. The signals then go to a 12AT7 balanced mixer, where they are heterodyned against the VFO signal. The VFO range is 800 to 1000 kc., and the consequent signal in the

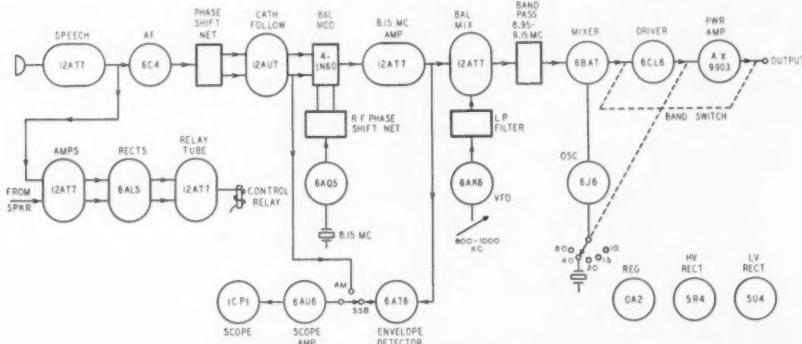


Fig. 1 — Block diagram of the SSB-100 transmitter.

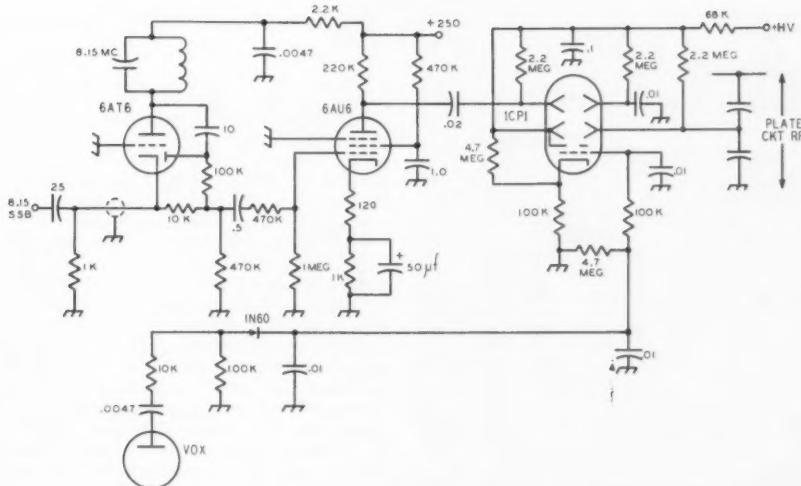


Fig. 2 — Schematic of the monitoring section of the SSB-100. The 8.15-Mc. s.s.b. signal is amplified and rectified in the 6AT6, giving the envelope of the s.s.b. signal. The envelope signal is amplified in the 6AU6 and used for horizontal deflection on the 1CPI 'scope. The vertical deflection for the scope is a fraction of the output signal, and any departure from linearity in the stages from 8.15 Mc. to the antenna will show up as a deviation from a proper trapezoid pattern. The intensity of the 'scope picture is determined by the amplitude of the voice; a portion of the audio in the VOX circuit is rectified in the 1N60 and applied to the grid of the 'scope tube.

output will be 8.95 to 9.15 Mc., depending upon the VFO setting. To reduce spurious signals, the output of the VFO is filtered before it reaches the balanced mixer. The resultant signal is coupled through a bandpass filter to a 6BA7 mixer where it is heterodyned to the desired amateur band and then amplified in a 6CL6 driver stage and a paralleled Class AB₁ AX-9903 output stage. (The AX-9903 is two tetrodes in one envelope.) Broad-band coupling is used between the 6BA7 mixer and 6CL6 driver, but the grid and plate circuits of the AX-9903 are tuned by panel controls, and the output coupler is a pi network. The bandswitch selects the crystal for the 6J6 oscillator (the two sections are connected in parallel) and the corresponding circuits in the 6BA7, 6CL6 and AX-9903 stages.

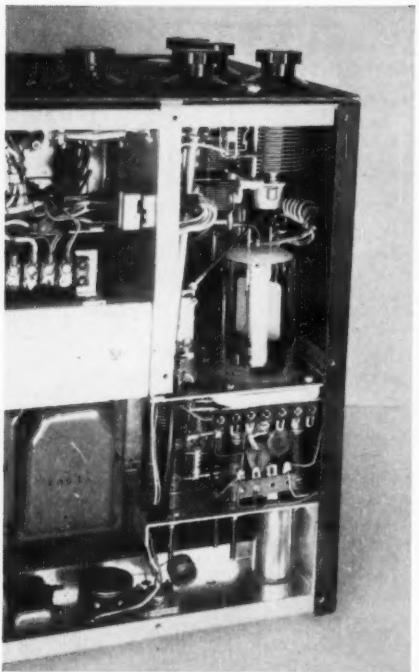
For voice-controlled operation, audio is taken from the speech amplifier, amplified in a triode of a 12AT7 and rectified by a diode of a 6AL5. The rectified signal is used to trigger a "oneshot" multivibrator circuit and actuate a control relay. According to the instruction book, the advantages of the m.v. circuit are practically no delay in turning on and a constant hang-on time (.8 second) regardless of the amplitude of the rectified voltage from the 6AL5. For voice-controlled operation with a loudspeaker, provision is included for amplifying and rectifying loudspeaker output through a parallel channel (the remaining 12AT7 and 6AL5 sections). This rectified signal rides along with the first channel as a bias, setting a level through the microphone channel that the operator's voice, but not a loudspeaker signal, can overcome.

The built-in monitoring oscilloscope takes a

little signal from the 8.15-Mc. amplifier, amplifies it (grounded-grid) in the triode portion of a 6AT6, rectifies it in one of the diodes of the 6AT6, amplifies it in a 6AU6 and uses it for horizontal deflection on the face of the 1CPI oscilloscope. The vertical signal is a small fraction of the r.f. appearing at the output stage. The resultant picture is, of course, a trapezoid, since the envelope of the original s.s.b. signal at 8.15 Mc. is being compared with the output signal in a ham band. Any departure from linearity is apparent, and flattening on peaks is readily discernible. The instruction book shows the patterns to be expected, and it shouldn't take anyone very long to interpret the patterns like a veteran.

For monitoring a.m., some of the audio in the speech channel is used for horizontal deflection, and again a trapezoid figure is obtained. However, when 100 per cent modulation is exceeded, a double trapezoid starts to show up. This is because "double sideband reduced carrier" is being generated. Nonlinearity, the real thing to worry about, of course shows up in this and the s.s.b. trapezoid as departures from straight lines on the upper and lower sides of the pattern. A crystal diode in the voice-control channel furnishes a signal from the operator's voice that turns on and controls the brightness of the oscilloscope, so the 'scope is only on when the rig is being used for transmitting and the screen doesn't end up as a badly-burned hole.

The power supply jobs are handled by a 5R4 and a 5U4 rectifier for the plate supplies, and a selenium-rectifier supply furnishes the necessary negative voltages for biases. The 0A2 voltage regulator tube stabilizes the screen of the 6AK6



A close-up view of the output stage that is tucked away under the right-hand corner of the SSB-100. The plate tuning and loading capacitors are near the front panel, and the switched grid circuits can be seen between the tube and the rear of the unit.

VFO and the plates of the 6J6 crystal oscillator.

The VFO requires $7\frac{1}{4}$ turns of the knob to cover its 200-ke. range. As delivered, the output ranges of the SSB-100 are 3.8 - 4.0 Mc., 7.1 - 7.3, 14.15 - 14.35, 21.35 - 21.45, and 28.5 - 28.7 Mc. Other ranges can be covered, of course, by plugging in other crystals in the 6J6 stage. The VFO is permeability-tuned, with a gear-

driven shaft and string-driven slide-rule type pointer.

As indicated in the first paragraph and confirmed by the photographs, there is a lot of gear packed into the 2 cubic feet the SSB-100 occupies. Full use was made of subassemblies, which can be tested separately and then installed and cabled together. To facilitate identifying components, the instruction book carries sketches of the individual subassemblies in which each component is given its circuit designation.

Panel controls include the VFO knob, final stage grid, plate and loading controls, and the audio gain control. The switches on the panel are power on, band selection, emission (A3 - LSB - USB), operation (CW - MAN - VOX - QT) and control (CAL - STBY - XMT). For those unfamiliar with the s.s.b. terminology, the VOX and QT of the operation switch stand for "voice-operated" and "voice-operated with a loudspeaker on the receiver." The gain controls for the VOX and QT circuits have to be adjusted when the rig is first installed (or when the microphone and/or loudspeaker are shifted or changed), so these controls are available at the rear of the unit. A meter on the panel indicates plate current to the output stage. Carrier-balance controls, which need adjusting rarely, are inside the SSB-100.

Keying for c.w. operation is done by grid-block keying the VFO. Rapid voice-control operation is obtained by keying (with the relay) the VFO and the grid bias on the AX-9903 output stage.

From an operational standpoint the manufacturers appear to have included all of the desirable features for easy tune up and monitoring, and it is hard to see how anyone who spends a little time with the well-written instruction book could do anything but tune his SSB-100 "on the button." As for performance, the instruction book states that third order distortion products are down 35 db. or more, carrier suppression is down 40 db. or more, the second r.f. harmonic is down at least 40 db., and the higher r.f. harmonics are down 60 db. or more.

— B. G.

The Hart-75 Transmitter

The "Hart-75" is a c.w. bandswitching transmitter that should have special appeal for the Novice because it will permit him to run the legal limit on the 80-, 40-, and 15-meter bands. Also, the transmitter should fill the needs of the General Class amateur interested in a 75-watt rig that will work 160 through 10 meters. It is a completely bandswitching transmitter with a pi-network output circuit. The r.f. section and power supply are mounted on a single chassis and enclosed in an 8 x 11 x 12-inch black crackle cabinet. The transmitter is available in kit form only and is marketed complete with all components (except key and crystal). In the r.f.

line-up, a 6AG7 Tri-tet crystal-controlled oscillator drives a pair of 807s in parallel. For 160-meter operation, 160-meter crystals are used; 80-meter crystals take care of 80 and 40, and 40-meter crystals are needed for the other bands.

A parallel tuned circuit is used in the output of the oscillator and is capacitor-coupled to the grids of the 807s. The amplifier works straight-through on all bands, and in order to prevent self-oscillation, the 807s are neutralized. Excitation to the 807s is less than rated when the transmitter is operated on 10 meters. The manufacturer states that while this is true, the output is considerably greater than if the 807s worked

as doublers on this band. In addition, there is much less danger of radiating an unwanted 20-meter signal.

The grid and plate circuits of the 807s are metered by switching to either circuit a 0-10-ma. meter connected as a voltmeter. The basic movement of the meter is used when reading grid current and a multiplier is switched into the circuit to read plate current.

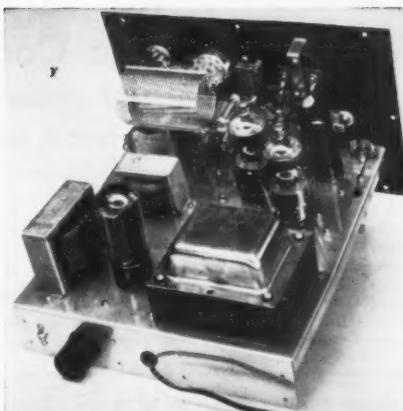
Two separate bandswitches are used, one for the oscillator output tuning and the other for the pi-network inductance. Depending on the output load impedance, a 5-position switch is used to switch in the desired amount of capacitance. An RCA type phono jack is used for the output receptacle and the output can be fed directly into the antenna or antenna coupler.

The keying system should be of particular interest to the c.w. operator. Differential keying of the oscillator and amplifier is accomplished by a double-pole, single-throw, 6-volt relay. The relay contacts are adjusted so that the oscillator comes on slightly before the amplifier. As the reader may or may not know, differential keying is turning on of the oscillator slightly before the amplifier and then turning off the oscillator slightly after the amplifier. This type of keying greatly aids in reducing chirp.

Key clicks are minimized by using a shaping filter, quite an innovation in a low-priced transmitter. The filter consists of an iron-cored inductor, paper capacitor and a resistor. By using the 6-volt relay, maximum voltage across the key terminals is 6 volts and the key is not very "hot".

Harmonic radiation from the transmitter is restricted by the complete metal enclosure. In addition, all power, key, and meter leads are bypassed with disk ceramic capacitors.

One power transformer is used for all the volt-



In this rear view of the Hart-75 transmitter, the 6AG7 oscillator is visible at the upper right-hand corner of the chassis. To the left of the oscillator are the 807 amplifiers. At the upper left-hand corner of the chassis is the fine loading capacitor of the pi network. Just above the capacitor is a section of the pi network inductor.

ages in the rig. Plate voltage for the 807s is approximately 500 volts, and the manufacturer gives a maximum power input rating of 80 watts for the transmitter. An auxiliary socket is mounted on the back apron of the transmitter chassis to accommodate modulator connections.

A separate modulator, designated the AM-1, is available from the manufacturer. The modulator uses a 12AX7 dual-triode speech amplifier and a 6550 modulator. Crystal, dynamic, or ceramic microphones can be used. Choke-coupled plate modulation is used to modulate the amplifier. The transmitter can be run at 55 watts input on phone. The modulator size is 4 1/8 inches wide, 6 7/8 inches deep, and 5 1/2 inches high. — L. G. M.

WWW-WWVH SCHEDULES

For the benefit of amateurs and other interested groups, the National Bureau of Standards maintains a service of technical radio broadcasts over WWV, Beltsville, Md., and WWVH, Maui, Territory of Hawaii.

The services from WWV include (1) standard radio frequencies of 2.5, 5, 10, 15, 20 and 25 Mc., (2) time announcements at 5-minute intervals by voice and International Morse code, (3) standard time intervals of 1 second, and 1, 4 and 5 minutes, (4) standard audio frequencies of 440 cycles (the standard musical pitch A above middle C) and 600 cycles, (5) radio propagation disturbance warnings by International Morse code consisting of the letters W, U or N, together with digits from 1 through 9, indicating present North Atlantic path conditions and conditions to be anticipated. (See *ARRL Handbook* for details on interpretation of forecast symbols.)

The audio frequencies are interrupted at precisely one minute before the hour and are resumed precisely on the hour and each five minutes thereafter. Code announcements are in GCT using the 24-hour system beginning with 0000 at midnight; voice announcements are in EST. The audio frequencies are transmitted alternately: The 600-cycle tone starts precisely on the hour and every 10 minutes thereafter, continuing for 4 minutes; the 440-cycle tone starts precisely five minutes after the hour and every 10 minutes thereafter, continuing for 4 minutes. Each carrier is modulated by a seconds pulse, heard as a faint clock-like tick; the pulse at the beginning of the last second of each minute is omitted.

FEED-BACK

R. W. Johnson, W6MUR, notifies us of this "feed-back" that occurred in conjunction with the publication of his manuscript in the December issue. In the equation on Page 46 the k should be f_B/f_A . f_B is the higher frequency, f_A the lower one, and k is greater than unity as indicated. Curves in the diagram are labeled correctly.

In the keying circuit of W8ETU's "Modern Medium-Power Transmitter," page 12 of the October, 1955, issue, the junction between R_2 and the 8.2K resistor should be grounded.

Strays

During a visit by W9BP to W9GWR, Roy Morrison, of Skokie, Illinois, the conversation drifted around to a pet cat that was quietly investigating the shack. A remark to Roy that this cat, following a serious illness, could not meow, brought this reply from its owner: "Yes, this is a 'low mu' cat."

A Rugged 28-Mc. Coaxial-Antenna Design

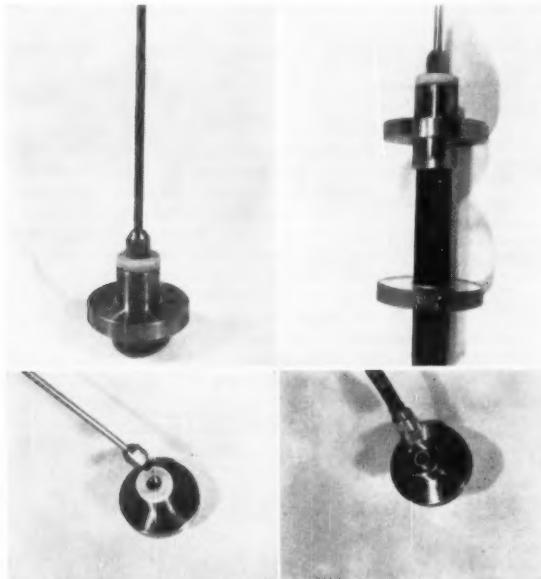
Mechanical Features of a Vertical Antenna

BY STEVE A. HORVATH,* W8PVZ

- Building a 10-meter vertical antenna that will stay put in all kinds of weather involves more attention to mechanical than electrical details. The antenna described by W8PVZ in this article shows careful attention to the mechanical details, and it should be just the thing for good general-coverage operation.

LOCALLY, there is quite a bit of 10-meter fixed and mobile activity and, since skip conditions aren't always the best, many of the QSOs are of a local nature. Mobile coverage with a fixed station using a beam or long wire is difficult at times, which brings us to the subject of types of antennas. Since we're concerned mostly with ground-wave coverage, the vertical antenna is about the best for all-around operation. Ground planes and vertical coaxials are very common, and they are economical to buy or build. Having seen a few types of coaxial vertical antennas, we decided to incorporate the good points we noted along with a few of our own. And we might add that there certainly will be many who will have a few good points to add to the antenna we now describe!

* 203 17th St., N.W., Barberton, Ohio.



Views of the coaxial antenna skirt support and components in different phases of assembly. Reference to Fig. 1 will identify the parts.

In the vertical coaxial type of antenna the point where the whip, skirts and feed line are combined is probably the most important part of the antenna. This is the point that was given prime attention. It's hard to give an exact name for this point, but we'll call it the "skirt support." Careful study was given as to what kind of metal to use and what shape would be the best. Steel, aluminum and brass are a few of the metals that could be used. We decided that brass was best because it will weather very well and it is very easy to handle in a lathe. Drilling and tapping also turned out to be a simple matter. The skirt support was made of one solid piece that added to the electrical length of the upper half of the antenna.

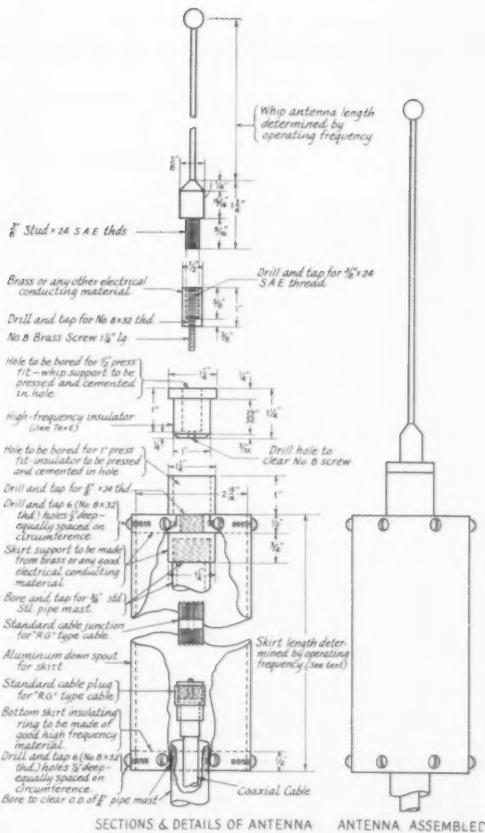
It is very important that the pieces described be made accurately, so that when they are assembled their centers are exact or close to it.

Construction

The mechanical details of the antenna design are shown in Fig. 1. The whip used for the top half can be purchased at almost any ham parts dealer selling mobile ham gear or, if other types are needed, assorted lengths of aluminum tubing can be ordered through your local hardware dealer. The center bushing that actually holds the whip in the support was made of brass because of its good conducting qualities and the elimination of corrosion and rust problems.

The insulator that is inserted into the support could be made of almost any good insulating plastic such as polystyrene or

Fig. 1 — Mechanical details of the coaxial antenna.



lucite. Probably the easiest material to obtain is the plastic handle of a screw driver. When the insulator is inserted into the support, a plastic cement or solvent should be used to make sure the insulator is secure in the support and to prevent the possibility of moisture getting into the base of the insulator. In our case, the brass used for the antenna was obtained from the local scrap-metal dealer at a very reasonable price.

After the parts have been machined, the coaxial junction is tightened into the skirt support. A No. 8 brass screw was used to connect the bushing, and the whip is screwed into the coaxial junction. The threads to hold the junction in place can be made on a lathe, or a special tap can be used. It may be possible to borrow the latter from a neighborhood machine shop or a friend in the machinist trade. The thread which the mast is screwed into can be pipe thread or, better yet, a uniform thread with no taper as is used on conduit. Whatever type of pipe is used for the mast, care must be taken to make sure there are no burrs or sharp edges near the thread end that is screwed into the support, because the coaxial connector that the feed line is connected to comes very near the inner wall of the mast.

The insulation at the bottom of the skirt is also made of good plastic. The thickness can vary according to the material available. We found that half-inch sheet plastic was quite suitable. Care should be taken that the screws fastening the skirt to the insulator are as short as possible, to assure clearance between the ends of the screws and the mast.

Depending on the height, the mast should be made of suitable material to support the antenna under a variety of weather conditions. The skirt used for 10-meter operation is Sears-Roebuck aluminum rainspout, which has a 3-inch outside

diameter and is sold in 10-foot lengths for about two dollars.

The dimensions of the whip and skirt are obtained from the following formulas, to the nearest sixteenth of an inch.

Length of the top section or whip:

Frequency in Mc. divided into 235.6.

Length of the bottom section or skirt:

Frequency in Mc. divided into 243.3.

Examples of a few lengths for whip and skirt for 10-meter operation are as follows:

Freq., Mc.	Skirt Length	Whip Length
28.5	8' 6 3/16"	8' 3 3/4"
29.0	8' 4 1/16"	8' 1 1/16"
29.6	8' 2 3/8"	7' 11 1/2"

This antenna was in operation on the 10-meter band, fed by a length of RG-11/U coaxial cable 35 feet long. The standing-wave ratio was less than 1.5 to 1.

Up until now no tests were made on the other bands; however, we believe the design would be applicable. Like any vertical antenna, height will add much to the effectiveness on ground wave. The antenna also does a surprisingly good job with skip conditions.

High Stability in a Crystal-Controlled VFO

A Simple Beat-Frequency System

By JO EMMETT JENNINGS,* W6EI

IN THE EARLY days of radio, oscillator stability was not too seriously considered; later, problems in stability were encountered and various methods have been used to produce oscillator stability in transmitters. Free-running self-excited oscillators generally have varying degrees of stability resulting from changes in the filament or plate voltage, temperature, vibration and shock as well as loading — all of which make the desire for stability more important when used in these particular situations.

Usual Methods

Mobile operation, with the VFO in its present state, is generally satisfactory for a.m. operation or if the VFO is operated at a low frequency and mixed with a high frequency crystal. Our scope of experience has not encountered any VFO capable of producing a stabilized signal with a variation of only a few cycles when subjected to the changes mentioned above. One scheme for making a variable crystal oscillator by shunting the crystal with an inductance gives a small degree of frequency shift up to 4 kc. The change, of course, is not linear and, as the frequency deviates from the

* 970 McLaughlin Ave., San Jose 8, Calif.

• In this system, two crystal-controlled oscillators are fed into a triode mixer, the difference between the two crystal-oscillator frequencies appearing in the output of the mixer. Frequency is varied by variable capacitors in shunt with the crystals. Greater variation than obtained with more conventional arrangements is secured by simultaneously increasing the frequency of one oscillator, and decreasing the frequency of the other.

crystal fundamental frequency, instability increases to the point where it becomes a truly self-excited oscillator under no influence of the crystal.

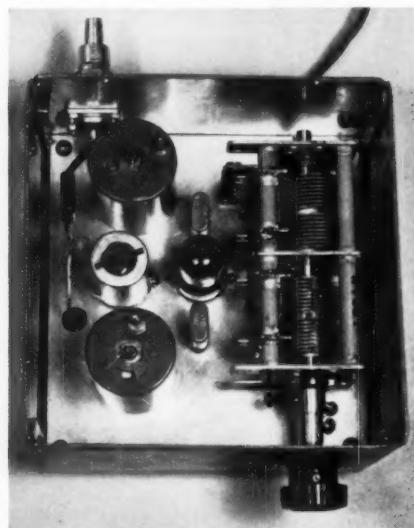
New Approach

We were desirous of building an improved type of oscillator but could not find a simplified method until we contacted our friend Virgil Way, W6BYW, of Monitor Products in South Pasadena. A short time later, he sent us a circuit diagram and two special-type crystals, type CR-18U, which were expected to give an improved frequency shift over any other method with which we were familiar. Such a circuit has been constructed in several forms at the laboratory by Buddy Alvernaz, W6DMN. Careful frequency measurements were made with this system and it performed even better than Virgil had described.

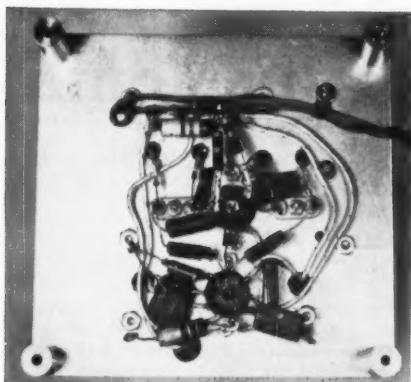
The photographs show the completed variable crystal-controlled oscillator and its mixer. The output is constant over the frequency range of 12 kc, and is essentially a linear function of frequency vs. change in capacitance. A calibrated dial is used with a 180-degree rotation, and the whole operation is smooth. Frequency is not subject to vibration, shock, hand capacitance, filament- or plate-voltage changes or load. When it is turned off, the output gradually disappears without shifting the frequency.

Theory

The crystal oscillator using a pair of special type Monitor crystals is built into a 12AX7 shielded Pierce oscillator circuit. There are two variable sections of approximately $100 \mu\text{f}$. per section which serve as feed-back capacitance for grid and plate. The two sections for each tube are mounted on the same shaft. However, as one pair of capacitors is increased in capacitance, the pair for the other tube is decreased. As you can see, this causes the frequency of one oscillator to



Interior view of the variable-frequency crystal oscillator. The 12AX7 is between the two crystals. L_1 and L_2 , and their tuning capacitors, are enclosed in shielding cans. The size of the box will depend upon the components used, particularly the capacitor gang.



Bottom view showing arrangement of small components.

increase while the other decreases. The net result is a double frequency shift. The one question with which we were concerned was that of varying outputs due to change in feed-back. However, when the mixer tube is overdriven, saturation occurs which maintains a constant output and gives an output which overbalances the section which is underdriven and the final output remains constant.

Performance

We have tested this oscillator for single-sideband operation in fixed stations and mobile operation and find it answers our problems of stability as well as size and weight, since this particular oscillator was built to operate on 3.801 to 3.813 Mc. Should such a system be

desirable on any of the other bands, the resultant frequencies could be set to be in harmonic relation at which time more frequency shift could be obtained; that is, every time the frequency is doubled, the frequency shift would be doubled. It is also possible to use this system on its fundamental frequency through 14 Mc. These are special crystals, smaller than the conventional FT243 which does not seem to give as wide a frequency shift as these new models. Using a frequency of 11,529.6 with a marked frequency of 7722, we produced the frequency shift of 3801 to 3813. One must always remember in working out a beat-frequency system of this type that crystals never increase in frequency when circuit capacitances are added in the form of a feed-back to the tube. As such, the fundamental frequency of the crystal starts near the marked frequency and gradually decreases in frequency as the capacitance is increased. It is also obvious that other frequencies than the ones mentioned will perform in the Pierce oscillator sections so the individual is not limited to these values. Since they were supplied to me by Mr. Way, he had them calibrated and ready to operate as soon as our actual circuits were completed. Results were gratifying due to the stability as well as ease of operation, and the output was a requisite for remote operation where coaxial lines present a loss factor and we wanted this unit to give equal or greater output than the crystal even though it was located a distance away from the transmitter.

In s.s.b. operation, it is seldom necessary to shift frequency far at the 3800-ke. end of the phone band. If a person wished to jump to the other end, it would only be necessary to have a switch for a crystal approximately 7890 ke. for

(Continued on page 116)

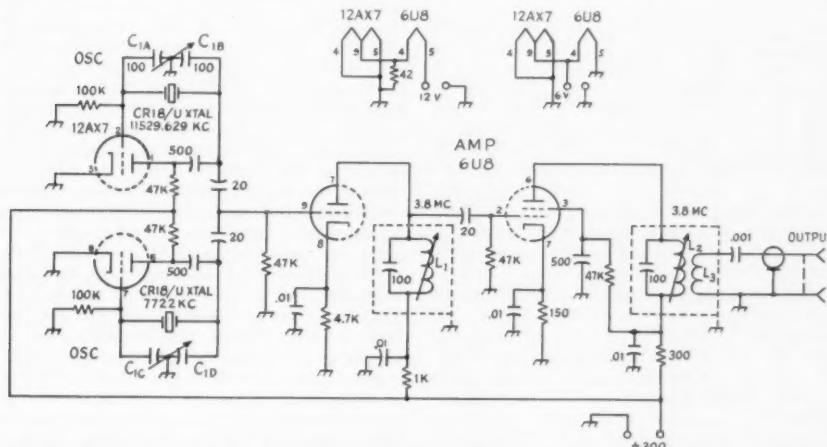


Fig. 1 — Circuit of the variable-frequency crystal oscillator. All capacitances less than $0.001 \mu\text{f}$. are in μf . All $0.01\text{-}\mu\text{f}$. capacitors are disk ceramic; all other fixed capacitors are mica. All resistors are $\frac{1}{2}$ watt. C_1 is a four-section variable arranged so that C_{1A} and C_{1B} decrease capacitance as C_{1C} and C_{1D} increase capacitance. Four single capacitors, or two split-stator units may be substituted. L_1 and L_2 are iron-slug coils having an inductance of approximately $17.5 \mu\text{h}$. (45 turns No. 28 close-wound on National XR-50 $\frac{1}{2}$ -inch form). L_3 is 6 turns wound over the lower end of L_2 .

Happenings of the Month



WHAT BANDS AVAILABLE?

Below is a summary of the U. S. amateur bands on which operation is permitted as of January 1st. Changes will, as usual, be announced by WIAW bulletins. Figures are megacycles. A0 means an unmodulated carrier; A1 means c.w. telegraphy; A2 is m.e.w.; A3 is a.m. phone; A4 is facsimile; A5 is television; F1 is frequency-shift keying; n.f.m. designates narrow-band frequency- or phase-modulated radiotelephony; and f.m. means frequency modulation, phone (including n.f.m.) or telegraphy.

3.500-4.000	- A1
3.500-3.800	- F1
3.800-4.000	- A3 and n.f.m.
7.000-7.300	- A1
7.000-7.200	- F1
7.200-7.300	- A3 and n.f.m.
14.000-14.350	- A1
14.000-14.200	- F1
14.200-14.300	- A3 and n.f.m.
14.300-14.350	- F1
21.000-21.450	- A1
21.000-21.250	- F1
21.250-21.450	- A3 and n.f.m.
26.960-27.230	- A0, A1, A2, A3, A4, f.m.
28.000-29.700	- A1
28.500-29.700	- A3 and n.f.m.
29.000-29.700	- f.m.
50-54	- A1, A2, A3, A4, n.f.m.
51-54	- A0
52.5-54	- f.m.
144-148	} A0, A1, A2, A3, A4, f.m.
220-225	
420-450 ¹	} A0, A1, A2, A3, A4, A5, f.m.
1,215-1,300	
2,300-2,450	
3,300-3,500	
5,650-5,925	- A0, A1, A2, A3, A4, A5, f.m.,
10,000-10,500	pulse
21,000-22,000	

All above 30,000

¹ Plate input power must not exceed 50 watts.

In addition, A1 and A3 on portions of 1.800-2,000, as follows:

Area	Band, kc.	Power (watts)	Day	Night
Minn., Iowa, Mo., Ark., La. and east, including Puerto Rico and Virgin Ids.	1800-1825	500	200	
	1875-1900			
N. and S. Dak., Neb., Colo., N. Mex., and west, including Hawaiian Ids., Texas, Okla., Kansas	1800-1825	500*	200*	
	1875-1900			

* Except in State of Washington where daytime power limited to 200 watts and nighttime power to 50 watts.

Novice licensees may use the following frequencies, transmitters to be crystal-controlled with a maximum power input of 75 watts.

3.700-3.750	A1	21,100-21,250	A1
7,150-7,200	A1	145-147	A1, A2, A3

Technician licensees are permitted all amateur privileges in 50-54 Mc. and in the bands 220 Mc. and above.

DOCKET 11488

Though we have previously reported the Notice of Proposed Rule Making in Docket 11488¹, and offered some suggestions for the observance of Rules on Radio Alerts², we believe it proper to mention here that in mid-December the Commission amended our rules to require amateurs to provide some means of monitoring the broadcast band to insure station silence during periods of Conelrad alert. Accordingly, the Commission has added Rules 12.190 to 12.196¹ to cover the situation. The new rules become effective January 2, 1957, or sooner if the Commission so orders, and require that amateurs have some method that will enable them to continuously monitor the broadcast band; or alternatively, assure themselves, before going on the air, and at least every ten minutes thereafter, that a normal situation prevails. Normal broadcast station operation may be considered as evidence of a non-alerted condition while the confinement of stations to 640 kc. or 1240 kc. would indicate that an alert existed. *QST* will continue to keep amateurs informed on improved monitoring methods.

STAFF NOTES

We regret to announce the resignation from our staff of Harold M. McKean, W1CEG, our managing editor since 1949 and a member of the Hq. staff since 1946, when he joined our editorial staff from a local newspaper, following service with the U. S. Coast Guard during World War II. Mac served us mightily, for the task is much more than the *QST* title implies; it was his job not only to put together *QST* each month, but to tackle the production problems of each annual revision of the *Handbook* and all the other volumes in the ARRL library. Their consistently excellent editorial appearance is a tribute to his extensive knowledge of production work.

Taking over in his place is Richard L. Baldwin, W1IKE, who formerly was with us for four years as a member of the secretarial staff and therefore rejoins us with a lot of built-in League know-how. Dick, a native New Englander, saw service in the Navy during the war, principally as a two-striper communications officer on destroyers with the Pacific Fleet, and came to us first in 1948 following completion of his education at Bates College and Boston University. He is an expert traffic handler, and an avid contest man, is WAC, WAS and DXCC (141 countries confirmed). We're glad to have him back.

¹ *QST*, October 1955, page 47.

² *QST*, January 1956, page 34.

• Technical Topics —

Linear Amplifiers for A.M.

ONE of the by-products of single sideband is a revival of interest in linear amplifiers for amplitude modulation, particularly on the part of a.m. users who don't understand the limitations of the linear. Linear amplifiers for either s.s.b. or a.m. belong to the same breed and operate in exactly the same way. The difference between



the two is in the kind of signal they have to handle, not in the amplifiers themselves.

A single-sideband signal is essentially one whose amplitude is proportional to the instantaneous amplitude of the modulating waveform, so when there is no modulation there is no signal. Usually, this means that there is comparatively little d.c. input to the amplifier during those periods when there is no modulation or low-amplitude modulation — periods that represent a large percentage of the total time in voice communication. This is quite similar to the operation of a Class B modulator — which in fact is simply a linear amplifier operated at audio rather than radio frequencies.

In contrast, in a proper a.m. signal the *average* amplitude stays the same whether or not there is modulation. Merely generating an unmodulated carrier demands just as much d.c. input as generating a fully-modulated signal. This is the key to the difference in ratings on a linear amplifier for a.m. as compared with s.s.b.

What Is Linearity?

The word "linear" in this connection implies that there is a fixed ratio between the amplitude of the r.f. signal applied to the grid and the amplitude of the r.f. output voltage in the plate circuit. In other words, any change in the r.f. voltage applied to the grid is accompanied by a proportionate change in the amplifier's r.f. output voltage. So long as this simple relationship holds true the amplifier's output faithfully reproduces the variations in — that is, the modulation on — the signal applied to the grid.

One operating requirement that will be recognized immediately is that any r.f. voltage, no matter how small, applied to the grid must cause *some* output to be delivered by the plate, and this in turn requires that some plate current must flow even with the smallest possible grid signal. That is, the grid bias cannot be greater than the plate-current cut-off value (although smaller bias is permissible); any larger value would "clip" the signal. This bias requirement establishes a ceiling on the tube plate efficiency.

At the other extreme, the r.f. grid voltage must not be allowed to become so large that a further increase in it will not be accompanied by a corresponding increase in the r.f. output amplitude. If increasing the r.f. grid voltage does not increase the output the amplifier is said to be "saturating," and the modulation is clipped on the up-peak in much the same way that biasing beyond cut-off would clip it on the down-peak. Both types of clipping distort the output signal and the amplifier is no longer linear. The no-saturation requirement establishes the operating range.

What you can get out of a linear amplifier depends principally on how much power can be squeezed out at the upper (large-signal) end of the



linear range. If there is any trick in the adjustment of a linear amplifier, this is it.

Plate Efficiency

What makes a linear amplifier linear? With the plate modulation customarily used in a.m., the plate voltage on the Class C amplifier is varied above and below the d.c. supply voltage at the modulation rate. The amplifier's plate current varies right along with the plate voltage, and so when the plate voltage is instantaneously doubled at the modulation up-peak the plate current likewise is doubled. Similarly, when the plate voltage is instantaneously zero the plate current likewise is zero. (These variations occur at audio frequency and so do not register on d.c. meters.) Since the plate voltage and plate current vary together, the Class C plate circuit "acts like" an ordinary resistor, in which the current is proportional to the applied voltage and the power is proportional to the square of the voltage.

In a linear amplifier the supply voltage does not vary with the modulation. The only thing in the plate circuit that can be varied is the plate current. The modulated r.f. grid voltage can cause corresponding variations in the plate current, and without attempting to dig into the technicalities of tube operation, it can be said that these plate-current variations can, within the operating limits mentioned above, be responsible for a fundamental-frequency r.f. output current whose modulated amplitude faithfully follows the amplitude variations in the modulated r.f. grid voltage. To a fair approximation, as most tubes are operated, the d.c. plate current

is proportional to the amplitude of the r.f. grid voltage. Thus we have a circuit in which the plate voltage does not vary at an audio-frequency rate during modulation but the plate current does. This means that at a modulation up-peak the plate current is twice the carrier-only value while the plate voltage remains the same; that is, the power input is doubled. Compare this with plate modulation where the voltage and current are both doubled and the power is four times.

Now it is necessary to reach four times the carrier power on a modulation up-peak if the amplifier is to operate without distortion. The fact that the r.f. output current and r.f. grid voltage go hand in hand does guarantee that the output power will meet this condition, because on the modulation up-peak the r.f. output current is doubled as compared with the carrier value. Twice as much current in a constant value of resistance — and the load coupled to the plate, as represented by the load coupled to the plate through the tank circuit, is constant — means four times as much power, by Ohm's Law. Thus even though the power input is only twice as great at the peak, the power output is four times as great. How is the difference accounted for?

This can be made clear by citing an example. Suppose that at the up-peak the instantaneous plate current is 200 mA. and the plate voltage is 1000, an input of 200 watts. If the plate efficiency is 70 per cent, a not-unreasonable value, the output will be 140 watts. If the r.f. grid voltage is now dropped to one half its former value, corresponding to the unmodulated carrier figure, the plate current will drop to 100 mA., and since the plate voltage remains the same the input is 100 watts. The r.f. output current also drops to

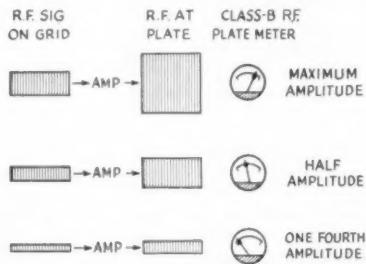


Fig. 1 — Three levels of operation in a linear amplifier when the grid is driven by a steady (unmodulated) signal whose amplitude can be adjusted within the limits of linear operation.

If the maximum amplitude within the linear range is shown as the top, a half-amplitude signal on the grid will be followed by a drop to one-half in the output amplitude. The d.c. plate current likewise will drop to one-half the value it had with the maximum-amplitude signal. Similarly, decreasing the grid drive to one-fourth amplitude will be followed by corresponding decreases in output amplitude and plate current.

Strictly speaking, the plate meter will behave as shown only when the amplifier is operated true Class B; that is, biased to cut-off. With Class AB operation, where the no-signal plate current is appreciable, the d.c. plate current will not follow the grid driving voltage amplitude as low levels. Class AB operation is usually preferable to straight Class B because the AB amplifier is more truly linear at low levels.

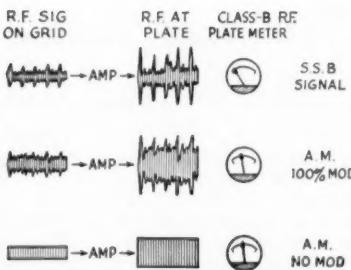


Fig. 2 — Behavior of the linear amplifier with a modulated signal. These drawings are to the same scale as Fig. 1, so the peaks in the s.s.b. and 100 per cent a.m. cases have the same height as the maximum-signal condition in Fig. 1.

With s.s.b., the plate current will vary at a syllabic rate according to the signal amplitude, as suggested in the upper drawing. In most cases, the d.c. meter will just "kick" on peaks, to about half the value shown in the maximum-signal drawing of Fig. 1. The a.m. signal will show the same plate-current reading whether or not the carrier is modulated, as shown by the two lower drawings above. The carrier amplitude and plate-meter reading are just half the maximum value shown in Fig. 1.

Note that the a.m. modulation drawings show a greater area than the s.s.b. drawing even though both signals have the same instantaneous amplitude on modulation peaks. This means that the a.m. signal has more average power than the s.s.b. signal, and since the power is handled by the amplifier at about half its maximum possible efficiency, the power used in heating the plate is considerably greater. Of the greater average power put out in the a.m. signal, over two-thirds is carrier and less than one-third is voice modulation.

half its peak value and so the output is one-fourth its peak value, or 35 watts. The plate efficiency is now 35/100 or 35 per cent instead of its peak value of 70 per cent.

At other values of r.f. grid voltage the plate current and plate efficiency are proportional. The smaller the r.f. grid voltage, the smaller the plate current, plate power input, and efficiency. This is simply a consequence of the fact that while the d.c. input is directly proportional to the r.f. grid voltage, because the plate voltage is constant, the r.f. output is proportional to the square of the r.f. grid voltage.

Handling the Carrier

These relationships hold regardless of the type of signal being amplified — i.e., whether it is a.m. or s.s.b. In either case the power output, power input, and plate efficiency vary with the amplitude of the modulated grid signal. The loss in the plate of the tube, which is what determines how much power the tube can handle, likewise varies with the modulation. Thus in the example above, where the input on a modulation peak is 200 watts and the output is 140 watts, the power left on the plate is the difference, 60 watts. At the half-amplitude point the power input is 100 watts and the output is 35 watts, leaving 65 watts on the plate. Note that although the input is halved, the plate loss actually is a little higher than under peak output conditions. The fact is that the plate loss does not vary much with the grid signal level

except at low levels where the input likewise is low.

Now in both s.s.b. and a.m. the grid signal amplitude, the plate input and the power output all are varying at an audio-frequency rate. The s.s.b. signal starts from zero with no modulation, just like the Class B modulator, and when the amplifier is biased near cut-off the power input and plate loss are substantial only when the modulation is fairly high. This means that the plate of the tube is heating only part of the time. Add to this the fact that voice waveforms commonly have only about half the energy content of a sine wave and you have the condition where the amplifier is delivering its full output on modulation peaks with an *average* input of only about half the power that would be required to sustain the peak. Both these things mean that the *average* power loss in the plate is fairly low with an s.s.b. signal — in the neighborhood of one-fourth the loss under peak conditions. The tube can handle quite a large peak input without getting hot.



The a.m. signal, however, does not start from zero with no modulation. It works up and down about the carrier level, which is just one-half the modulation up-peak level. When there is no modulation the tube is still called upon to deliver the unmodulated carrier, and since the carrier is at half level the output is one-fourth the modulation-peak output and the plate efficiency is one-half the modulation-peak efficiency. Actually, the efficiency increases with modulation, but since there are times when a speaker has to stop to catch his breath, the amplifier has to be designed to handle the unmodulated carrier safely. The tube gets hotter with no modulation than with it — quite in contrast with the s.s.b. case.

To resume the example above, on a.m. the tube would have to be able to dissipate 65 watts safely on its plate in order to give a carrier output of 35 watts. On s.s.b. the same tube with the same output on the modulation peak would have an average plate loss of around one-fourth the peak loss, or about 15 watts. Putting it another way, if the rated plate dissipation of the tube is the limiting factor in design, the a.m. amplifier would require a tube having a rated plate dissipation of 65 watts, but the same tube as an s.s.b. amplifier could give a peak output $65/15$ or about four times as great as the peak output on a.m., the plate heating being the same in both cases.

Actually, the 70 per cent modulation-peak efficiency assumed in the example is a little optimistic in many cases, and for estimating purposes it is convenient to assume that the maxi-

mum efficiency will be 66 2/3 per cent. This leads to the rule of thumb that on a.m. the carrier power output that can be obtained from a linear amplifier is equal to half the rated plate dissipation of the tube. It is easy to see why a linear amplifier is not worth while unless it uses a fairly big tube.

Where the Linear Might Be Useful

Altogether, it would seem as though the linear for a.m. would offer few attractions. This is especially so where it is being considered for following a plate-modulated transmitter running 75 to 150 watts input. The possible power gain, in most cases, is too small to be interesting.

It is possible to visualize cases, however, where there might be some advantages in the linear amplifier. Most such amplifiers need very little driving power for fairly substantial power output. By using any of several tetrodes in Class AB₁, or zero-bias triodes such as the 811A, there is no need to provide extra driving power simply for the sake of throwing it away to get good regulation — i.e., low distortion — in the amplifier's grid circuit. Hence the driver need supply only a few watts of modulated output. Also — and this is a point seldom appreciated — the *total* d.e. power required by the complete transmitter is just about the same, when a low-power driver followed by a linear amplifier is compared with a plate-modulated amplifier with its higher-power driver, Class B modulator, and more elaborate speech amplifier. The total amount of equipment is considerably less, for the same carrier output, with the linear amplifier, and in most cases the total cost is lower. The catch is, of course, that the most carrier output that can be hoped for with a kilowatt input is around 350 watts as against 700 or 750 with plate modulation. But if your requirements are not for more than 300 to 350 watts carrier and you're starting the complete transmitter from scratch, it might be interesting to work up the comparative costs of the two systems.

One of the nice features of such a rig is the ease with which an s.s.b. exciter can be substituted when you reach that stage. — G.G.

Strays

"For sustaining service to amateur radio, and administrative leadership," the Institute of Radio Engineers conferred the grade of Fellow upon George H. Bailey, W2KH, its executive secretary.

The Association for Applied Solar Energy is retaining permanently in Phoenix, Arizona, the Solar Powered Amateur Radio Station (September *QST*). The exhibit will be kept in a group for display with appropriate credit to ARRL and WICUT, the exhibitor. In connection with the exhibit a new \$700,000 solar research laboratory will be opened by the Stanford Research Institute, also in Phoenix.

• Technical Topics —

Frequency Calibrations

THE other day we received a letter from a reader suggesting that a printed scale that could be cut out and pasted on the dial of the completed unit be included with any VFO article. Undoubtedly, others have thought of the same idea but haven't bothered to write. It should be easy, you might say; it has been done for things such as ohmmeters and wavemeters.

It is easy in the case of an ohmmeter or wavemeter. The milliammeter used in the ohmmeter has a scale of known tolerance (2 per cent in the better meters), and we can rest assured that you can duplicate our results if you use the right values of resistance and a decent meter. The wavemeter has a possible frequency range of 2½ or 3 to 1; you can't read it much closer than $\frac{1}{2}$ Mc. and it doesn't matter if it runs off a little, because you won't use it for accurate frequency checking.

A VFO is a little different. Let's say we build one to cover the range 3.5 to 4.0 Mc. and we use a 180-degree scale on our dial. (It doesn't matter if the VFO is on 1.75 to 2.0 Mc. or 3.5 to 4.0; the scale will show the frequencies in the 80-meter band.) We can build the VFO with a small trimmer capacitor across the variable (Fig. A), use a

the entire range, because the variable capacitor manufacturer must be permitted some tolerance over the increments of change over the range of the capacitor, and capacitors that duplicate exactly over the entire range cost a lot more than ones that don't.

We have two more tricks we can pull. One is to use a third type of circuit, one with a capacitor in series with the tuning capacitor (Fig. C). With this circuit, the frequency is pulled to the high-frequency check point by the trimmer capacitor, a midpoint is dragged by the variable inductor, and the low-frequency end is modified by the series capacitor. With a little patience and three hands you can make your tuning correspond to ours — at three points! There is still no guarantee that the VFO will show correct frequency at the other points, because the capacitance-increment tolerance mentioned above is still in effect.

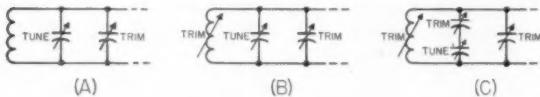
Our last trick is the one the capacitor manufacturer uses when he sells precision capacitors that must hit a calibration curve on the button: he bends plates. In other words, he laboriously bends little tabs on one or more of the rotor plates and by careful adjustment he can bring all of his capacitors into very close to exact tracking. It takes skill and it costs money. Suggesting that a *QST* reader bend plates on a capacitor to bring his calibration into exact track with a printed scale would be about as popular as TV receiver horizontal oscillator harmonics

are. It is really a lot easier to provide a design in which the tuning range can be set to the proper limits and then to let the individual constructor calibrate his own dial.

Receiver Calibrations

By now it should be obvious why all but the most expensive receivers can't be used as accurate frequency meters. To make each receiver match up to a printed scale, the tuning capacitor must be built with very close tolerances or there must be some means for bringing it into track at the receiver factory. If inductive tuning is used, the same problem exists and the same solution applies. The impecunious amateur has two possible courses if he wants to use his inexpensive receiver for frequency checking: he can bend plates on the tuning capacitor and bring the receiver into track with the scale (probably on only one band), or he can make a correction chart for his dial. The latter takes only a frequency standard (with 10-ke. intervals), a sheet of paper and some time. The former requires the frequency standard and quite a bit of patience. And, of course, the frequency drift of the receiver must already have been reduced to a minimum.

— B. G.



(A)

(B)

(C)

piece of prewound coil such as "Miniductor," and we know that by varying the trimmer you can bring your scale into calibration at *one* point, say the high-frequency end. The low-frequency end might not coincide on the scale for several reasons. Unless you use exactly the inductance we did it will be in error; the inductance change can be caused by manufacturing tolerances in the coil (should be slight), variation in lead lengths between your unit and ours, and the proximity of other objects to the coil (that consequently changes the inductance). The variable capacitor manufacturer must be permitted some tolerance, and every one of his capacitors in the same model is not likely to have exactly the same minimum and maximum capacitance.

Here in the shop we can get around the inductance variation by designing the VFO with an adjustable inductor as well as with a trimmer capacitor (Fig. B). Then we know you can make your calibration scale coincide with ours at *two* points, and these can be the extreme ends if desired. This takes a little juggling on your part, because the two trim controls interlock, but it isn't at all difficult to do.

What about the rest of the range? There is no assurance that the scales will coincide over

Paradox: S.S.B. Splatter and Modern Receivers

As you look over the current crop of communications receivers, you can't help but see that more and more attention is being paid to the reception of s.s.b. phone signals. Forms of band-pass filters appear to be replacing the simple crystal filter in many of the bigger receivers, often backed up by a "rejection notch" that permits tuning out at least one interfering heterodyne. More attention is being paid to the beat-frequency oscillator level and tuning, and various types of detectors best suited for heterodyne reception can be found. Automatic volume control with the b.f.o. on, once a very *rara avis* indeed, is becoming more common. All in all, you can't help but get the impression that the manufacturers are conscious of the interest in s.s.b. and are making provisions in their receivers for it.

Now let's drop back in the past a few years, when s.s.b. was just getting started and was having considerable growing pains. A common cry among some of the poorly-informed operators was, "That s.s.b. is too broad — it takes up too much room in the band!" Time after time the story was told to them: s.s.b. is not broad when properly adjusted, but the a.v.c. in your receiver makes it seem so. In articles in *QST* and in conversations over the air it was suggested that operators listening to a.m. learn how to use their receivers a little more intelligently in the presence of an intermittent signal like s.s.b. In plain words, this simply meant turning off the a.v.c. and reducing the r.f. and i.f. gain until the peaks of the nearby (in frequency) s.s.b. signal didn't overload the receiver. It was pointed out how the a.v.c. was incapable of doing this job properly and that it could only be done manually. It was further stressed that the "splatter" from a well-adjusted s.s.b. signal simply disappeared when the receiver was held down below its overload point, and that the splatter was generated in the receiver itself. For those who couldn't be convinced by mere talking, it was suggested that a trip be made through a band crowded with a.m. signals with the a.v.c. off and the manual gain up, to simulate the condition one faces when the a.v.c. can't protect against overload by a nearby s.s.b. signal. This was a very convincing demonstration, as many can testify.

In other words, if you're trying to listen to an a.m. signal and there is a stronger s.s.b. signal 3 or 5 kc. on either side, you simply can't get solid copy from the a.m. signal with the a.v.c. on unless your receiver has superior skirt selectivity that rejects the s.s.b. signal to a fare-thee-well. Without the skirt selectivity, you stand a chance with the a.v.c. off and the i.f. gain backed down, but practically none with "ordinary" selectivity and the a.v.c. on. This isn't just true of s.s.b. — the same effect would be noticed with a strong c.w. signal nearby — but we don't run into the strong nearby c.w. signal quite as often when listening to a.m., except perhaps when chasing DX. And, for psychological reasons, even then the c.w. sig-

nal is not quite as annoying because it has a more nearly constant QRM pattern.

Back to the present again. While the current receivers have some mighty fine selectivity by earlier standards, it still isn't the superior skirt selectivity mentioned earlier, because that really requires practically straight-sided selectivity characteristics, and we don't know how to obtain them yet. Consequently, the operator who buys a new or second hand receiver is still occasionally faced with the problem of receiving weak a.m. in the presence of a strong nearby s.s.b. signal. Having read *QST* and listened on the air to the savants, he calmly reaches over to his receiver to turn off the a.v.c. and — horror of horrors! — finds that he turned on the b.f.o.! Yes, that's right; some of the receivers currently in use and in production, with all their provision for receiving s.s.b. and only one sideband of an a.m. signal, make no provision for turning off the a.v.c. without turning on the b.f.o. On the one hand they're promoting s.s.b. by including features that help in its reception, but they seem to have lost sight of the fact that there are a few a.m. operators around who don't want to use "exalted-carrier" reception. Yes, all you can do with these receivers in the presence of a nearby s.s.b. signal is to tune in the a.m. signal with your b.f.o. on and zero-beat the incoming carrier with the b.f.o. This will clear up the troubles if the receiver gain and tuning are properly handled, but it gives the operator two things to think about (tuning and gain) instead of only one, and in some circles this is a very unpopular approach.

We admire the manufacturers for trying to get more operators to try exalted-carrier reception, but we think they should make it possible to learn receiving techniques one step at a time. Please, no more "communications" receivers without an independent a.v.c. switch!

— B. G.

Strays

Mosley Electronics, Inc., St. Louis, Mo., announce publication of the Mosley QSO Index, a handy volume designed to aid amateurs in recording calls and operators' identification, for use particularly during contests, when time is at a premium. The new book is complete with a full index of names.

A new manual to assist manufacturers of equipment for the armed forces in meeting the requirements of radio interference specifications that may be of interest to hams is available through the Department of Commerce, Office of Technical Services. The text was prepared by the Signal Corps Laboratories at Fort Monmouth, New Jersey. Information contained in the manual is particularly applicable to amateur bands, it is indicated.

A Variable-Frequency Crystal Holder

Modifying Surplus-Type Crystal Holders for Shifting Frequency

BY ALLEN A. ENGLEMAN,* W4RMU

THOSE WHO operate crystal-controlled transmitters will probably be interested in this article at once, but even the fellow who has used nothing but VFO for years should not pass it up. There are uses for crystal control in every ham station, and those uses could be expanded considerably if a convenient and satisfactory means were available for varying the frequency of the crystal by even a small amount.

Net operators know very well how hard it is to be exactly on frequency, and the higher the frequency the greater the difficulty. "Spot-frequency" v.h.f. nets, for example, often spread over many kilocycles either side of the specified channel, and even 3.5-Mc. crystals marked alike will not work on exactly the same frequency when used under varying circuit conditions. V.h.f. men, normally the least inclined to VFO operation, will find that the order of frequency multiplication used on 50, 144, and higher bands will transform the few kilocycles of shift available with these crystal holders into frequency changes of major proportions.¹ This could be of considerable advantage in solving the QRM problem that



An FT-243 surplus crystal modified for variable frequency control.

presently develops around the popular surplus-crystal channels when a v.h.f. band is open.

How It's Done

The frequency at which a crystal oscillates is dependent on several factors in addition to the

* RMU Crystal Company, Oceanway, Florida.

A crystal marked 6006.667 kc., selected at random from a surplus collection, was modified according to the instructions given here. Originally it provided a frequency of 144.16 in the 2-meter band. With the modification it gave smooth control from 144.16 to 144.26 Mc. with substantially no variation in grid drive to the final stage. This was in the band-switching exciter originally described in *QST* for September, 1952, and shown in all recent editions of the *Handbook*. — Ed.

thickness to which it is ground. One of these is the spacing of the metal electrodes, shown in exaggerated form in Fig. 1A. This is the FT-243 type holder, commonly called pressure mounting. The spring pressure is between 2 and 6 pounds

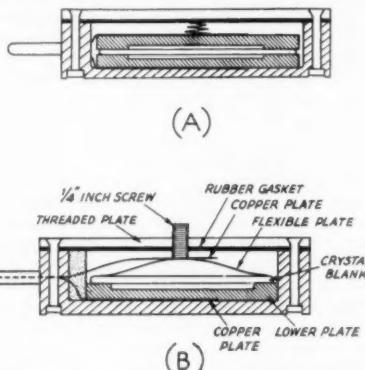


Fig. 1 — Cutaway views of the FT-243 holder, A, and its modified form, B. The crystal is clamped at its four corners in the original holder, with spring pressure maintained at between 2 and 6 pounds per square inch. In the variable-frequency device a flexible plate is substituted for the top electrode, and pressure is controlled by a screw adjustment.

per square inch. The crystal is clamped at the four corners and it will cease oscillating or be damped considerably if the pressure is increased to the point where the electrodes touch the crystal at other than these points. However, the spacing can be increased to several times that found in the commercial holders before oscillation ceases.

The crystal is most sensitive to changes in electrode spacing at the center. A number of crystal manufacturers have made use of this principle to provide variable-frequency crystals. It is a perfectly orthodox and practical method for varying the frequency of oscillation in a quartz crystal, and one that is readily adapted to use with inexpensive surplus crystals in FT-243 holders.

A simple way to vary the spacing is to substitute a flexible plate in place of the upper electrode in the holder, as shown in Fig. 1B. This flexible electrode is cut from 0.004-inch brass or 0.003-inch steel shim stock. It is cut the same size as the crystal plate and then bent around a $\frac{1}{8}$ -inch diameter rod. The corners should be rounded slightly on an emery stone, or with a very fine file. It is important that the surfaces of the plate be perfectly free of burrs, and the material must

(Continued on page 118)

Using the MB-40SL as a Grid Tank

Simple Modification for Better Performance

BY KATASHI NOSE,* KH6IJ

After constructing amplifiers using the National MB-40SL in the grid circuit of high-power tetrode amplifiers with pi-network output, it became apparent that efficiency was sadly lacking on the high-frequency bands. On 28 Mc., the coil became hot enough to char the form, the plastic melted off the link wire, and the Faraday shield dropped off. But on the lower-frequency bands there was an overabundance of drive. Using a Viking Ranger, about 70 watts of drive produced about 1.3 watts usable output at the grid of a 4-1000A. A similar lack of efficiency was found in another amplifier using paralleled 4-250s.

With slight modification, heating is reduced, the drive is equalized, efficiency stepped up on the high frequencies, 160-meter operation added, and more positive neutralization is realized. A diagram of the original tuner and modification is shown in Fig. 1.

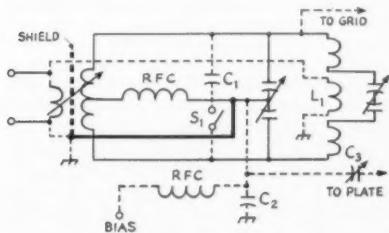


Fig. 1 — In this diagram, the dashed lines show wiring to be added. The heavy line indicates a connection to be removed. The remainder is the original circuit of the MB-40SL multiband tuner. The 160-meter padder, C_1 , is a 400- μf , 2500-volt mica unit. S_1 is a ceramic wafer switch, and L_1 is a single-turn link.

Better Matching

The original link was designed for impedances higher than that of the usual coax line. Removing two or three turns of the original five-turn link, and grounding one end directly to chassis stepped up the drive. This alone may suffice. However, a one-turn link, wound around the center of the high-frequency coil, and connected in parallel with the regular link, brings the excitation directly to the high-frequency coil without going through the low-frequency coil. These two modifications brought up the efficiency tremendously, and reduced heating to a negligible level. In use, the variable link is loosely coupled for high-frequency operation, and coupled tightly for low-frequency operation. A reduction in drive is encountered on the low-frequency bands, but this

* Libue, Kauai, T. H.

• If you have had trouble using the MB-40SL as a grid tank circuit the simple modification described here should solve the difficulty. Included is a means of extending the coverage to 160 meters.

is greatly offset by the gain on the high-frequency bands.

Neutralizing

In the popular Breune neutralizing circuit, included in Fig. 1, the frame of the tuning capacitor is above ground. The original Faraday shield is grounded by a strap to the frame of the tuning capacitor, and therefore is above ground by a voltage equal to the neutralizing voltage. Removing the strap and grounding the shield directly to chassis ground eliminated erratic neutralization.

Paralleling the low-frequency section of the tuning capacitor with a 400- μf , mica capacitor permits operation on 160 meters. A ceramic wafer switch is used to remove this padder when not in use.

CALLING ALL NOVICES: CQ N-R!

The Novice Round-up makes its fifth annual appearance this year, February 4th through 19th. Old-timers are invited to join in the fun and give the newcomers contacts.

Full details appeared in January *QST*, but as a reminder, don't forget that the Round-up starts on Saturday, February 4th, at 6:00 P.M., local time, and ends on Sunday, February 19th, 9:00 P.M. local time. A time limit of forty hours is available. This can be used any way you prefer in operation on 80, 40, 15 and 2 meters.

You've still time to get extra scoring credits by qualifying in the Code Proficiency Run from W1AW on January 17th, or from W6OWP on January 7th. In the meantime, send to ARRL Headquarters for your free map of the United States, a contest log, and reporting forms for the Novice Round-up. The fine outline map can be posted in your shack to keep a visual check on your worked-all-states progress.

Remember to read January *QST* again for full details on rules.

USING B. C. SIGNALS FOR HAMBAND CALIBRATION

AN old-timer passed his idea on to me and possibly it may help some of the other fellows. The stunt is that of using a broadcast-station signal as a frequency standard for making calibration checks in hambands. Here is how the idea is put into practice.

First determine which b.c. stations would have harmonics — if they were not suppressed because of FCC regulations — that fall in the hambands. For example, here in Indianapolis we have the following combination to work with:

Station	Fund. Freq. Kc.	Harmonic Kc.
WLW	700	5th — 3500
WLW	700	10th — 7000
WISH	1310	3rd — 3930
WIRE	1430	5th — 7150

Next, using an r.f. signal generator and a receiver with the b.f.o. turned off, zero beat the generator with the b.c. signal. Leave the generator set as is and tune the receiver — with the b.f.o. turned on — across the ham-band undergoing calibration. When the harmonic of the generator has been found, turn off the b.f.o. and zero beat the VFO (or other r.f. generating device under test) with the generator harmonic.

Since the b.c. stations operate with a very close frequency, this method should provide a dependable frequency check.

— *Albert Szalay, W9CKD*

A BUILT-ON CLICK FILTER FOR THE TYPE J-38 KEY

THE popular surplus J-38 key has a set of extra terminals which, when removed, provide space and mounting holes for a small "Minibox." The box may be used to enclose a key-click filter and also as the mounting for a send-receive switch. There is enough room on the rear wall of one of these boxes to accommodate a connector for the leads running to the receiver and the transmitter.

Nice thing about the set-up is that the filter is placed right at the key where it belongs, and the send-receive switch is about as close to the key as it can be located.

— *Clifford A. Mason, K2AFO*

FORMED PLASTIC WASHERS FOR MOUNTING MOBILE ANTENNAS

IT is sometimes desirable to mount a mobile antenna on the fender or rear deck of a car where the body is not flat. Each such installation presents a problem of obtaining specially shaped washers to go between the car body and the antenna mounting surfaces which are always flat. The following method will provide a close-fitting and professional-looking job.

Two thermoplastic (plexiglas or lucite) washers about a quarter inch thick and the same diameter as the antenna base are first roughed out with a hack or jig saw. They must then be trued up in a lathe so that the outside rim and

the hole are round and concentric. The plastic washers are then placed in a pan of boiling water for a few minutes until they are soft enough to bend. One of the washers is then fished out of the water and immediately placed on the exact spot where the antenna is to be mounted and bent to fit the curvature of the car body at that point. The plastic ring can be handled either by wearing gloves or simply holding it with a dry rag. In a few minutes the washer will cool and set to the shape of the car body. If the underside is the same shape as the top surface, both washers may be shaped from the outside, which is easier.

The washers are then centered in a three- or four-jaw lathe chuck. They are easily centered by trial and error as extreme accuracy is not required here. The convex face of one washer is then turned flat and the concave face of the other one is made flat.

These two washers will now fit against the car body, one inside and one outside, with both external surfaces flat and parallel. The antenna can be mounted on them with a neat fit that would be very difficult to obtain any other way.

— *C. A. Thunen, W6ACT*

MAKING FARADAY SHIELDS

THE CONSTRUCTION of Faraday shields can be simplified by using materials included in etched-circuit kits. The desired shield is drawn on a piece of copperclad phenolic using the special etch-resistant ink. Etching solution is then used to remove the unprotected copper, leaving the shield ready for easy mounting.

Incidentally, most mail-order houses list the kits under the *printed circuit* heading of their catalogues.

— *E. Laird Campbell, W1CUT*

SERVICE HINT FOR COLLINS SERIES 75A RECEIVERS

THE COLLINS 75A series receivers are famous for their frequency stability and calibration accuracy, but the rigors of time, humidity, and wear may cause the variable-frequency oscillator to shift and throw the dial calibration off to the point where it can no longer be corrected with the zero set. If the calibration error is the same on all bands, the variable oscillator is at fault. If only one band is off calibration, the first oscillator for that particular band should be suspected.

The 75A-3 at W4CEN, when new, was calibrated perfectly at the high-frequency end of all bands, but at the low-frequency ends it was necessary to move the zero set pointer three kc. to the left to correct the calibration. This pointer can only be moved four kc. either side of zero center. After a year's use, the calibration drifted off two more kc., so it was no longer possible to correct the calibration with the zero set. The oscillator unit is completely sealed and there is no provision for adjustment of the oscillator frequency. The Collins instruction book says to remove the oscillator unit and return it to the fac-

tory when this condition occurs. If the calibration error is very great, these instructions should be followed.

In my case, such drastic action hardly seemed necessary, and I cast about for some easy method to correct the calibration. A very small reduction in the capacitance across the oscillator coil was necessary to do this. The tube tables in the *Handbook* list the input capacitance of the 6BA6 tube used in the oscillator (V_{14} in the circuit diagram) as $5.5 \mu\text{f}$. The tables list a number of other miniature pentodes with a lower input capacitance, among them the 6AK5, with an input capacitance of $4.3 \mu\text{f}$. The base connections are different, but the difference is in the manner in which the cathode and suppressor grid connections are made to Pins 2 and 6. Since both these pins are grounded in the receiver, the 6BA6 and the 6AK5 may be interchanged. A 6AK5 was then substituted for the 6BA6 in the oscillator socket, and presto, the zero set moved back to only one kc. to left of zero at the low-frequency end of the dial.

Incidentally, there may be considerable difference in the input capacitances of the same type tubes produced by different manufacturers. I discovered that a Tungsol 6BA6 had an input capacitance sufficiently lower than an RCA 6BA6 to move the calibration two kilocycles.

In cases where it is necessary to move the zero set to the right to correct the calibration, an increase in capacitance is indicated. This may be obtained by the simple expedient of taking a short piece of No. 22 solid hook-up wire, remove the insulation from about one-quarter inch at one end, form a small loop and crimp it around the No. 1 or grid pin of the 6BA6 oscillator tube, wrap the wire around the other pins to form a semicircle, and plug the tube back in its socket. The length of the wire may be adjusted until the calibration is correct.

— Tom Brandon, W4CEN

STORAGE RACK FOR SPOOL-WOUND WIRE

THE ROUND slender type of curtain rod that is available from most dime stores and hardware concerns makes an ideal rack for spools of wire. One or more of the rods may be easily mounted on the workshop wall, under a table or bench, or on the inside of a closet door.

— Thomas Skopal, W3WJN

WORKSHOP USE OF LIGHTER FLUID CANS

EMPTY Ronsonol lighter fluid cans make excellent non-spill containers for the several types of liquids commonly used in the home workshop. Suggested refills for the cans are: carbon tetrachloride for cleaning; kerosene as a cutting lubricant; gasoline for starting blow-torches, etc.; light machine oil for shafts, bearings, motors, and so on.

The plastic top dispenser can be flipped from a can with the aid of a screw driver and then

snapped back in place after the refill has been made. Fingernail polish can be used to identify the contents of a container.

— Cmdr. J. R. True, W4ROK

100-KC. MARKERS FROM A 50-KC. SECONDARY FREQUENCY STANDARD

A SECONDARY frequency standard described in *A QST* for July, 1954, duplicated for use here at W5RSH, has been modified so that either 50- or 100-ke. harmonics may be selected. Although the 50-ke. markers are extremely helpful for many types of measurements, there are times when an unknown frequency, or a band edge, can be more quickly identified if the standard frequencies are spaced no less than 100 kc. apart. Unless the 100-ke. points can be definitely established, there is a possibility of a measurement being inaccurate by at least 50 kc. or more.

The circuit of the modified standard is shown in Fig. 3. Notice that except for the addition of R_1 and S_{1B} , the circuit is identical to the original. Also observe that the resistor and the switch may be added without requiring any alteration to the basic circuit. The functions of the new components are as follows:

With S_{1A} closed, L_1 is shorted and the circuit takes on the appearance of the more familiar 100-

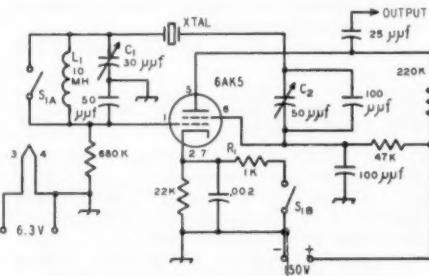


Fig. 3 — Circuit diagram of the modified 50-ke. frequency standard. All resistors $\frac{1}{2}$ watt. All capacitors less than 0.002 μf . are in μf .

C_1 — $30 \mu\text{f}$. ceramic trimmer.

C_2 — $50 \mu\text{f}$. ceramic trimmer.

RFC_1 — 10-mh. r.f. choke (National R-100S).

S_1 — D.P.S.T. switch.

kc. standard. With L_1 shorted, crystals cut for 100, 200 and 1000 kc. will oscillate in the circuit, but the activity of the crystals leaves something to be desired. However, crystal activity can be raised to normal by reducing the value of the cathode bias resistor for the 6AK5. This is easily accomplished by means of R_1 and S_{1B} of Fig. 3.

If the circuit has been adjusted to zero-beat against WWV for accurate 50-ke. markers, it is probable that the 100-ke. (or higher) harmonics will be slightly off frequency when the circuit is switched over. This slight error is of no consequence provided the calibration using 100-ke. markers is rechecked with the aid of the more accurate 50-ke. frequencies.

— Clark A. Chamberlain, W5RSH
(Continued on page 152)

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

In the past two columns, among other things, we passed comment on Novice and newcomer DXers. Here follows a letter on that same tack, lines which reveal how the innocent 20- or 40-meter bystander can be divebombed by the DX bug with scarcely a moment's warning:

Dear Jeeves:

In scanning back over some old *QSTs* note was made of your admonition (Feb. '53) to the fraternity to refrain from hiding even low-glow dial lights under the plate cap.

There's nothing—but strictly nothing—remarkable about the content of the following notations. But my DX, paltry as it may be, was unintentional, almost accidental, and not premeditated or purposeful, as it were. Fact is, having at last licked oncoming arteriosclerosis and the FCC, thus being shut of the "N" in my call (the 12-year-old jr. op. W0QQH, passed his code the *first* time) I had a powerful urge to draw three to an inside straight for WAS. In scanning around, some N.H. activity was noted on 20 meters, so the hunt was taken up on that band as well as 40, and the downfall of the Olde Prof became imminent.

In the course of events G PY LU DL VK F were picked up (it's impolite not to answer a friendly CQ) with KH6 (plus WH6) KZ5 KG4 KL7 and two VE8s as salt and pepper. Yesterday the original mission was fulfilled and I now sweat out the N.H. QSL as well as the others.

I discover, however, that an insidious cerebralia was developed by even this minor exposure to DX, to those faint and far-off signals. As an electroencephalographer by trade I believe this disease is characterized by paroxysmal cerebral DXrhythms, easily demonstrated by recording the electrical activity of the auditory area of the brain. A peculiar series of square-shaped pulses may be detected, the sequence of pulses forming something like dits or dahs. In a far-gone case it is possible to demonstrate pulses translatable into "ON4" "CR8" "OA" "VQ5" and other strange combinations not readily decipherable through background QRM. Anyway, Jeeves, you have a new convert to your department and vice. And when you get that all-band tiny-beam worked out, you *will* publish it, won't you?

—Doc, W0USP

P.S.—Jr. op W0QQH, now turned 13, picked off VK3PG one recent night when his OM inadvertently left the shack to hunt up some cold suds to cool the final tank. So you've got two converts as a matter of fact. —Doc

One might surmise it likely that a lasting immunity to the ravages of DX fever could be attained through constant exposure. This may be true in rare cases. But here's another interesting letter from one sworn-off OT who dared to make a casual inspection of 14 Mc. one recent evening:

"How's DX?":

Now don't get the idea that I've had another attack of my old DX fever or anything like that, but—it just so happened that the other night around suppertime I turned on the receiver and there was a genuine PX on 14,020 kc. knockin' 'em off like flies. So I worked him. . . .

Well, now, I got my "200" sticker back in 1950 when there were only about fifty of 'em around, and when I had 500 watts and a two-element beam and conditions were good. Then we moved, the antenna came down, and I became a suburban dweller complete with power mower and vegetable garden. The old HRO just didn't get turned on much except for the CD Parties and the SS (you wouldn't

expect me to give *those* up, would you?) and a couple hundred watts seemed like plenty. But you know, after working that PX it seemed sorta natural to turn on the receiver the next night just before supper. And waddaya know—VQ6LQ! I suppose I should have quit right there. But after a few more tries I got FB8BR (QSL already, too), VQ8AG, and this A.M. before work neighbor W1KFW called up to say that a 3A2 was on 14,060. So I worked him for a total of five fast new ones. . . .

There have been some changes in the past five years, though. The pile-ups are a little worse, there are more kilowatts and big beams, and it seems that everyone is a little more desperate. Maybe frantic is the word. Man, there's no such thing as an even break or courtesy anymore. Or do you suppose I've aged a little? Big DX hogs like old — and — have stepped aside for even bigger DX hogs like — and —. Many new big and middle-sized wheels have cropped up, too.

But one thing hasn't changed. Pick any hour of the day or night and let ACTAA sign his call just once. Then sit back and check off Ws 1FH SHGW 6VFR and the rest of the really good top men as they work him and again go back to their listening.

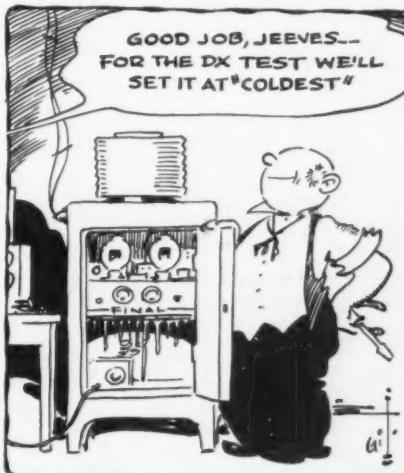
Been reading and enjoying "How's" for these past five years but haven't dared to listen for the stuff or write to you any more than an AA dares mix old-fashioned. If you hear from me again before 1960 you'll know I've *really* weakened.

—Roger, W1JYH

Any bets we won't?

What:

In ages gone by, DX fever was characterized by an urge to loiter down by the wharves, watching seagoing vessels handling cargo 'mid dreams of the Orient, Spice Islands and the antipodes. How fantastic it would have seemed to young Marc Polo and Chris Columbus if they had been told that some day ordinary folk like themselves would step inside their parlors, throw a few switches and communicate directly with those distant points! We take such a miracle for granted in the realm of modern amateur radio. This is how it comes about, band by band. . . .



* 4128 North Tripp Ave., Chicago 41, Illinois.



HB9KB-3A2BH, far right, joins with (standing, l. to r.) 3A2e, AU, BF, BH's XYL, AH, AM's sister BL, F9XV; (front) BE, AJ and AM on a recent tour of TV station Tele Monte Carlo conducted by sound engineer 3A2AM. Those weird props are positioned for use on TMC kiddies' program "Bill of Marv." TV must be just about the same the world over! This occasion was a brief DXpeditionary respite for HB9KB who had 3A2BH set up for action in a near-by hotel. While some two dozen Monaco amateur licenses are extant no native 3A2 knows the code well enough to tangle with DX bands. And because native 3A2s prefer phone QSOs of local nature the country continues as one of the rarer European entities on the ARRL DXCC Countries List. (Photo via HE9RDY and US4KA)

20 c-w., our main DX highway to far-away places was W8KPL's route to **Cr6** CV (14,050 kc.) 11 GMT, CW (70) 11, **DU** 1CV (60) 3, 7SV 195, **5FO8** (80) 20, **HZ1AL** (80) 13, **MP4QAL** (60) 7, **W6LQ** (40) 13, **XW8AB** (30) 3, **BZ1BF** (70) 12, **ZC4RX** (120) 10, **ZD43A** (75) 13, **BS6A** (45) 10, **ZS7H** (80) 18 and other goodies. Before becoming **K4GUS** W9TgY had to go to **63** with the aforementioned **DU**, **HZ1AL**, **MP4QAL** and **ZS7H** and **Cr6** with **CT3AB** (5) **FFB1** (12), **LU3UZ** (59), **VU2BS** JK 48, **LU3UZ** (59), **AT4JN** (63) and **AT4JN** (63).

8AG (15) 13-14, VS⁴ 4BA (49) 13, 6CW (4) 14, VU2s AE
 AS AM BS DE DF HF JO SX all 13-15, VU2s (2) 13-14,
 Y12AM (1-56) 14, YO² 2VM 3FT 3RCC 6AW 8MS all
 14-18, one ZA1A (32) 14-15, ZC4Z CK (90) 15-16, 15W
 (61) 14-15, ZD6EF (30) 16-17, ZE6es (JU) (26) 17, JZ,
 ZP5HB (42) 2, ZS3BB (75) 21, 3V8FA (30) 19-20, 457S
 BPW (38) (CO), VE (40), GE (38), MN (43), MR (50)
 13-14, 4X4s (2) BH DX DA FA FK FR (13-20, 5AITD)
 (96) 15 and 954AX (30) 16, Fancy VU6JI (67) 1 on hand.

20 phone, fount of fancy A3 scenery, served W4ALX (ex-W9NRB) with DUs 10R 78V, ET3AH, FM7WN, FY7YF, KG1FR, MDSUK, ODSVA, O5CK, SV0WM, T3A3, VK1ZM, VS6s CG CW DE, VU2AK, ZC4IP, ZD4BR, 3V8FA, 4X4s DB and friend CR9A1, -9EWE and W4A1X grabbed HZ2AEH (103-19-20 who usually sticks to c.w. - W7WBQ stashed 6E6, 6E6A, 6E73A1, E45BA, ET2A2B, Coracian, F8RY/FC 19-20, FA3ZC, F8A9V, HASKBA (106) 14-15, H8GCI (10) the Galapagos, OX3K9, SV9W, TF53A, 3LF, 3LA 8A9, Q8B, V05ES, VU2EY, YI2AM, ZD4BZ and friend 4X4FK by mike means. Pitearing's VR6AC (143- Tuesdays and Saturdays, plus Gough Islander ZD9AD (215) 16-18, put good signals in at W6YY, AP2UZ (170), 14, CR2CZ (120) 14, ET2Us (182) 14, XX (280) 15, FB8C (158) 3, BZ, ZZ (23), HA4KBA (105) 14, KTIEXO (135) 0, MP4s KAB (150) 14, OA1 (304) 14, ODS5DA (14), 14, VK1VK (179), 15, YPIEE (190) 0, VU2AK (185) 14, GJ (118) 14, XWB8W (15) c.w.-to-phone XZ2s KN (145) 13, XX (151) 17-18, ZC4RX (121) 16, ZD6R (175) 16-17, ZSs 2MA (169) 5 of Marion Isle, 8I (100) 4, 9G (120) 3, 4X4s BL (308) 14, DR (114) 19-20, IE (116) 20 and 5A2KB (141) 15 are contributed by NCDXC and WGDXC sources.

15 phone revelry grows more tumultuous. W6ZZ made merry with CR9AH, DU7SV, EL12A, FO8AD, JASAD, FA OA, KA2 2DW 2KS 5CL 8AB, KCA6CG, W6PQF/KG6K, KR6s AB CR USA, KV4BD, KW6BS, KX6ZB, VQ3DQ, VS1UD and ZS9G. The Tanganyikas was Miles 100th 21-Mc. country, 72nd on A3. . . . K5AJP assailed EASBO, ELIA, HRFM, KGA4Q, KV4BI, VP8 ISD 7NG and YNIJO. . . . K6KJW and KV4BJ were among the many to fall prey to W9QJDG's new Ranger and SX-900. . . . W5HEX checked with FB5BZ, JASAO, PX1YR and VO4EO. . . . It's 91 on 15 phone at W4UWQ, FF8HA, GD3GMH, KASSD, OE1PC, VP4TE and YU3JN were instrumental. . . . W1PKW, QSYing from 10 to 40, stopped off on 15 to swipe EASAX 13 and HPSFL 20-21. The latter's QSL arrived but three days later. . . . WG and NC DXCs added EL3A (200) 13, FY7YE (195) 22, VP8s AQ (200) 1, BP4 (200) 1, VQ4E (220) 18-19, VU2CW (175) 13 and ZE2KJ (205) 20 to our 21-Mc. voice variegation.



VPIEK favors 28-Mc. phone work and does his part to bring 10 back as a prime DX band. Ernie uses a Globe Scout, WRL VFO, NC-98, Conset rotary beam and 136-foot long-wire. When ten is kaput VPIEK opens for DX business on 14, 7 or 3.5 Mc. Off the air Ernie doctors on the staff of El Cayo Hospital, El Cayo.

FM7WD (88) 13, **GD3FXN** (25) 16, **TI2WR** (3) 16 and **4X4FA**, (48) 12, . . . W1CTW climbed to 87 on 15 c.w., with WBE wherewithal to boot; a GD3, **ZB2I**, **ZC4IP** and 3V8 assisted . . . **GC4EML** and **KG1KK** made it 101 16-Mc. countries for W6ZZ . . . W6PRM did away with **PJ2AV**, **SP5AR**, **YUS**, **VQ4** and **9SAAX** while reconnostering his limited acreage for a new ground-plane . . . **UB5KA** and a GD3 came back to K2BZT . . . ZD6BX gladdened the hearts of **IS1IFIC** 15-16 and **ZB1AJX** 19, . . . K2GMF's 20 watts is sufficient for **PJ2AA** (22), **TF3MB** (18), **YV8B** BJ (90), **BX** (15) and **9S4BN** (60). W8QOH/MM was working in the CR4 vicinity . . . W9FNX raised **9S4ABM** (65) 13-14, while W8XYD was busy with **EL2P** . . . **FY2YE** and **H1BLF**/Trieste worked W3YUW . . . FA3HH (42) 17, **8ZZ** (110) 16, **FQ8AG** 16, **U5AUA**, **VP2VB** (77) 20, **ZD9** **6RM** (10) 18 and **9AD** are specified by NCDXC informants.

40 c.w. supplied W1WAI with **PZ1LM** (4) 2 and **YV8CT** (2) 3, the latter supposedly scrutinizing algae on Aves Island . . . **DUTSV** (40) 15, **JAs** 1ANE (39), **IJH** (8) 1UV, **40P**, **3FV** (39) and **9S4AS** (38) between 15 and 16 GMT, collided with W7KQ . . . **KG1KK** and a **PZ1** submitted to W1PWX's pursuit . . . W4EUH snatched at **FASRJ**, **LZs** **UKA** (1KN) **2KAC**, **VP6CG** and **YQ2VM** . . . **VPs** **2G** (31) 20 and **8AL** (35) contacted . . . W2FJH . . . W9VBS worked **HK4DP**, **PJ2AJ**, **WP4ADR**, heard **DM2XL0**, **CR6AI** and **HP1LO** . . . K6DV netted his share of the 10-meter stuff and wished that rag-chewers would move up above 7050 kc, when the long skip slides in . . . W6RZS collected enough **JAs** on 40 to qualify for **JARL's** AJD sheepskin. **PJ2AV** and various European species also appear on Cherry's list . . . **NOV** (10) 16 on 10-Mc. at **KN4CQA**; **W6es**, **HLM** (151), **BOK** (175), **BRX** (178); notices **W2KZ** seeking **WN**/**KN** QSOs around 7147 kc. **KN0CER**: **W4P**, **W7A0Z**; **KG6s** AGC NAB, **KM6AX**. Forty phone finds **OE5C** (60) 1, **SV0WT** (50) 3, **Y12AM** (85) 3 and **4X4DK** (63) 2 putting readable signals into WGDXCer W3EGR's shack but a persistent 7-Mc. A3 DX man is a rarity these days.

10 phone, still on the skimpy fringe area of the m.u.f., isn't exactly a ball of fire right now. But it's good enough for **W2AEB** to nail down **CRs** **6BQ** **6CB** **7AQ** **7RB**, **FB8RG** (ex-F1D3RG), **HR3HH**, **TJ2US**, **VQ2s** AS **JW** **NS**, **YU1AD**, **ZS7C**, **4X4s**, **BL** and **FV**. And that ain't hay! . . . K5AJP adds **KT1PU**, **ZLs** and **ZSs** to the pot . . . W3ZKH snagged **CN8FRN**, **CR6**, **CR7**, **HICGU**, **Trieste**, **PJ2AF**, **VO2RH**, **ZB1GBF**, **Zes**, **2KR**, **6JJ**, **ZD6RM**, **ZS3AB**, **5As**, **1TA** and **2TZ** within two weeks of receiving his General ticket . . . **CN8FR**, **CR7** stacks of **ZLs**, **KL7s**, Europeans and **YU1AA** kept W8GNY on the ball . . . NCDXC and WGDXC join to recommend 28-Mc. vocalists **FQ8AG** (240) 19, **LX1DC** (180) 14, **QO5BW** (275) 19, **VR2CS** (410) 23, **ZD4BR** (325) 17, **ZS3A** (400) 19 and **E** (230) 18-19 . . . In the purified ionosphere of 10 c.w. we find W1PWX inhaling **ZD6RM** and **ZE6JJ**, while W6UWD made good with **ZE3JP** 18 . . . With 10 meters flexing its long unused muscles

once more, a few of the old 28-Mc. regulars are coming back into the DX swim. W1PWX hears W1GOU, for instance, a guy who captured over 150 countries on ten when the band was in its late-40s heyday. Unk swapped his old BC-610 TVI generator for a Viking II and resumes his march toward the 10-meter 200-mark.

160 c.w. DX doings got off to a slow start but now begins to show a profit. Two of the nastiest two-ways went to **V86CQ-ZL3GQ** and **G3PU-ZL1GX**. **KP4KD** got through to people like Ws 1BB 3FBV and K2MJZ. Ws 3FBV 8AN0 and 9PNE flagged down **T12BX** through the loran splatter. Transatlantics were scarce; **W3RQ** QSOd **G5CV** and **LU1EL** was reported heard in the British Isles . . . W3EIS clicked with Gs 3GGN 3V1 3PU 5JU 5RI 6GM, **HB9CM**, **KP4CC** and **KZ5P**. Don's pal W3MSK scored with three Gs, **HB9** and **T12** his first night on the band! . . . A new 160-meter country, **YN1AA** (1802), came back to **W2QHH** . . . **GD3UB** (1830) 5, **GI3IOS** and **VP1SD** are to be available on Top Band before OM Atmospheres again moves in, according to W1BB and W2FSN.

Where:

As the DX facet flourishes and prop conditions improve, DX and DX-workers are faced with mounting tasks in the confirmation department. Certain QSL short cuts will be attempted. It's a tragedy to receive an eagerly-awaited postcard only to discover that it doesn't bear data necessary for DXCC accrediting. The call signs of the confirmer and confirme, the geographical location of the confirmer if not conclusively indicated by the call, and the date of QSO — these represent the usual bare minimum so far as DXCC is concerned. You'd be surprised at the quantity of not-quite QSLs that enter ARRL Bureau channels with one or more of these "must" data omitted. Refer to page 57, October 1954 QST, for more detailed comment on the matter; also see W1VG's comprehensive "QSL Cards," October 1950 issue . . . **FBSZZ**, now reported doing big 20-meter business by W6YV, ought to receive considerable fan mail when the next mailboat calls at Amsterdam Isle in May . . . WGDXC allows as how DXers with difficulties in the VS4CT-VS5CT-ZC5CT QSL line might make profitable use of the QTH to follow. The Texans also remind us that W4PJU is of possible assistance regarding CR5UP verifications . . . Now awaiting his new VE3 tag, ex-VP5BN is available for QSL matters at the address following . . . Via W4LYV, **XZ20M** would like it made clear that he does answer QSLs by airmail on receipt of sufficient IRCs. Aung is raising power from 20 to 80 watts and gets good results with W5DQV's "Cubical Quad for 20 Meters," January 1955 QST . . . **WN5KNE**/DL hears that some UB5KAB-bound QSLs were bounced back from an Odessa address previously published. You can't figure this "U" business; other fellows report positive results via the same QTH . . . If you run across pertinent postal data on DX stations, not previously published, you'll be doing some one a big favor by sending it along. Just as W1WJ OJR PWK WAI WPO, K2BZT, W3NC, W4CBQ, KN4CQA, W6ZZ, W8KYD, W9A CFT EU, DI4ZC, ZD6BX, NCDXC and WGDXC did in these instances:

ARITI, P.O. Box 81, Beirut, Lebanon . . . **EL2P**, L. Hibbert, P.A.O. Box 36, Harbel, Liberia . . . **ET4TC**, Box 114, Addis Ababa, Ethiopia . . . **FORY**, FC, Bastia Airport, Corsica via France . . . **GB2SM** (QSL via G3JYL of RSCB) . . . **J3A5U**, Y. Tsukamura, Box 1042, Kobe, Japan . . . **KG1KK**, APO 885, New York, N. Y. . . **KL1ZAON**, G. A. Dyson, 1518 Westover Arms, Rosedale, Va. . . **KL7BBF**, Box 2432, Elisabethville, Belgian Congo . . . **Q3XK**, Julianehaab, Greenland . . . **PZ1BS** (QSL via W2HQL) . . . **PZ1LM**, P.O. Box 848, Paramaribo, Surinam . . . **SV0WZ**, W. Needham, USASC, APO 206, New York, N. Y. . . **TG9RR** (QSL via TG9MG) . . . **UB5KAH** (QSL via DL7AA) . . . **ex-VK1ZM** (QSL to **VK2ZM**) . . . **ex-VP5BN**, E. D. Squire, 3093 Danforth Ave., Toronto, Canada . . . **VP8AL**, A. F. Lewis, c/o Postmaster, Port Stanley, Falkland Islands . . . **VO2QZ**, N. A. Clark, 378 Chapman St., Broken Hill, No. Rhodesia . . . **VO2WP**, W. A. Pope, P.O. Box 69, Mazabuka, No. Rhodesia . . . **VS1DU**, M. R. de Cruz, Box 176, Singapore 1, Malaya . . . **YASG**

(QSL via RSGB) **ZC5CT**-**VS4CT**-**VS5CT**, P. H. Green, G3DCT, 15 Western Rd., Brentwood, Essex, England **ZE1BY**, RSSR, Bulawayo, So. Rhodesia **ZE2JZ**, P. Mould, 4 Narwick Pl., Braeside, Salisbury, So. Rhodesia **ZE4JN**, J. E. Rogers, P.B. 209a, Salisbury, So. Rhodesia **ZE5JC**, D. J. Driver, P.O. Staff, Gatooma, So. Rhodesia **ZE5JH**, S. Wright, Stand 15, Norton, So. Rhodesia **ZS3AM**, P. de Villiers, Posbus 251, Tsumeb, S.W. Africa **ZS4X**, B. E. Pietersen, P.O. Box 53, Victoria, O.F.S., U. of S. Africa **ZS7J**, A. Cloete, c/o Havelock Mine, P.O. Emblembe, Swaziland **3A2BN** (QSL to F7ER) **3A2BP** (QSL to F7AM) **3A2BQ** (QSL to F7CZ) **3WSAA**, P.O. Box 109, Hanoi, Viet-Nam.

Whence:

Asia — A few stations signing tantalizing HL and 3W8 prefixes are stampeding some of our more immature DX devotees but Korea and Viet-Nam still are under FCC-ITU ban at this writing. So are Cambodia, Indonesia and Iran. As W4LYV puts it, "Stations call and work 3W8AA by sending '3V8AA'. . . . I do not want to see these few irresponsible jeopardize our privileges. . . . They should realize that they are accomplishing nothing by working a country on the banned list because the QSLs won't count if received." The sham of pretending to mimic a verboten DX station's call is shallow, indeed. The trick establishes the practitioner as either a hopeless lid, or a candidate for the nearest hokey hatch, or both. This irksome ban list is gradually being eliminated through the required snail-like channels. Meanwhile we must use our noodles for something besides headphone holders. . . . W6ZZ calls attention to additional objectives for wallpaper hounds: Suginami (Japan) Radio Club's S-10, S-20 and S-30 certificates. DXers outside JA-land can qualify for these awards by confirming QSOs with two, four and six Suginami JA1s, respectively. There are approximately 100 Suginamians available and contacts must date after July 29, 1952. Write SRC Awards Manager, P.O. Box 20, Suginami, Tokyo, Japan, for current and detailed data. . . . MP4QAL toys with Oman DXpeditionary ideas, according to W2FJH K2CLA, stationed on Formosa, investigates hammering possibilities there but finds permit obstacles formidable. If Jerry swings a ticket in time he'll be pitchin' C3 or BV1 fastballs in the impending ARRL DX spree. W6YY reports that VS2DW, normally a serene soul, gets roughed up by the North American power pack while trying to boost his own countries tally. Tan dislikes falling back on "CQ NO W/K" and stones for it by continuing to work long strings of Yanks when in the proper mood.

Africa — Scattered African notes courtesy W6YY: ZD6RD, rarely off phone, denies responsibility for many c.w. QSOs perpetrated in recent months under his call in the name of "Chuck". . . . CR7s AU CO and DI regularly lead Mozambique's 14-Mc. A3 chorus. . . . ZS2AA informs that there are now over 80 South African YLs licensed and a diploma is available to certify the QSOing of any ten. . . . WG1DXC items from not-so-dark Africa include word that ZS2MI's Barrie is replaced by a new Marion Islander named Ken. . . . ZD3A's recent QRX resulted from rig trouble since alleviated. . . . Ex-ZS1PD/ZS8, Henry of ZSSL, visited the Cape and brought back



FD4BD, currently doing a solo for French Togoland, needs only a 6L6 final to stir up a hornet's nest on 20 c.w. His receiver is a BC-342 and the skywire is a Windom. You may have worked Pierre previously as FD8AB and FF8BE. (Photo via W9EU)

enough electronic ingredients to set up his ZE hamshack at Gadzema SUIAS drew applause for an extensive ham radio write-up in Egyptian roto magazine *Images* OQ5BI is boning up on a.s.b. and may soon give such emission a whirl on one or more of his three favorite phone bands Reference Ethiopia's gala Jubilee ham exhibit mentioned in last October's "How's", the call turned out to be ET3TRC and a goodly crowd was there. This call sign is the regular label of the Telecommunications Radio Club in Addis. Nyasaland tidbits thanks to ZD6BX: "ZD6RM keeps busy on 14, 21 and 28 Mc. and ZD6EF is mainly active on 14-Mc. phone or c.w. with his 829 final. An ex-DL2 will shortly be heard from Lilongwe, some 200 miles to the north of me, probably phone only." ZD6BX, himself, hits 20 hard, 15 and 40 lightly, using c.w. only.

Oceania — VK3WIA, staffed and organized by Wireless Institute of Australia stalwarts, opened 1956 with a jolly session at the Pan Pacific Boy Scout Jamboree in Victoria's Clifford Park. Some 10,000 Scouts were on hand to watch VK3WIA perform with a large Vee beam on 3.5, 7 and 14 Mc., c.w. and phone. Special commemorative QSLs will be forthcoming. VK9AU apprises K20AH that New Guinea local QRM is on the upswing with VK9s BS BW GB HO KT PF RE and RM contributing their shares. Of the nineteen WAVKCA certificates already handed down by WIA, nine are on the walls of U. S. A. hamshacks. In order of qualification they be W6YY 5KC 6ATO 8PQQ 1HA 6YC 2CC 8KPL and 7RT. WIA Awards Manager VK3XU comments: "Conditions down here are quite bright on 21 and 28 Mc. and seem to be improving generally with good European, African and South American openings. No need to mention North America, for we could doubtless hear you fellows on a

(Continued on page 122)

KX6AF, ham installation of the 1960th AAC Squadron, emits a familiar signal from crescent-shaped Kwajalein in the Marshalls. That's T/Sgt L. C. Kelsey in the driver's seat. (Photo via K20AH)





CONDUCTED BY EDWARD P. TILTON,* W1HDO

IN the ten years since we first moved from 56 to 50 Mc., we've seen how our lowest v.h.f. band reacts to all the variations of a solar cycle. We rode up over the peak of the previous cycle in 1947-8, down into the depths last year, and now we're hitting the steep upswing of another cycle.

During the heights of the last cycle, 50-Mc. amateurs around the world had unique opportunities to contribute to man's knowledge of v.h.f. propagation. CRPL predictions were available from the end of World War II on, but nobody really knew whether they would present an accurate picture of the maximum usable frequency for F_2 -layer communication. There would be many checks on their accuracy for frequencies normally used in long-distance communication, but only hams would be using the frequencies that were actually near the "maximum usable."

Most of the predictions, it turned out, were on the low side. From the charts it would have appeared that we had no chance of working across the Atlantic, for instance. But, fortunately, most hams did not know that, so they went ahead with tests with European stations. The result is history — hundreds of contacts by Ws and VEs with stations in England, the Netherlands, France and Switzerland. Heard reports were received from most other European countries.

On north-south paths the results were even more revealing. The predictions indicated that some South American contacts might be possible from the Gulf States, and with South Africa from northern Europe, and so they were. But for 50-Mc. men in the more northerly parts of the United States the prospects to the south appeared dim. According to the charts, the highest frequency that would be open between W1 and

South America, for instance, would be about 38 Mc.

Once again, mostly in ignorance of this, we proceeded to check with South American operators who were united with us in a common interest in seeing what could be done on 50 Mc. First, as on other paths, commercial harmonics began showing up around 48 to 49 Mc. Then, finally, breakthroughs were made to Ecuador and Argentina from all U. S. call areas, and to Peru from some of them. From Mexico and several Central American countries contacts were made regularly from 1947 to 1951 with countries below the equator, at times of the day when the predictions showed not the slightest possibility of such things happening.

At least two factors of some importance were turned up by this amateur pioneering. A type of propagation, as yet not completely understood or explained, was brought to light for the first time. This made possible late-afternoon or early-evening north-south work during the equinoctial periods, reported by XEIKE, XE1GE and many South American operators.

Then there was the discovery that peaks of m.u.f. much higher than had been expected followed the breakup of major ionospheric disturbances. The 50-Mc. contacts made with South America by VEs and the northern Ws invariably came after there had been auroral activity the previous evening. Similar correlation of high F_2 -layer peaks and ionospheric disturbances was observed on the Europe-to-South Africa 50-Mc. circuit.

Now we're approaching another period when such goings-on may be repeated. With television taking over the 50-Mc. region in Europe there'll be no two-way work with our friends across the

Rick Emerson, W3OJU, Washington, D. C., has been on 50 Mc. regularly for nearly ten years. His gear is entirely home-built, including the receiver and converter. The antenna is a stacked 4-over-3 array.



North Atlantic, though we'll probably have the distinction of setting some new TVI DX records! But there are still 50-Mc. men in several African countries, and all through South America. Those of us who are in a position to work DX on lower bands might well make good use of our DX facilities to line up 50-Mc. texts. Already, the predictions show areas of m.u.f. as high as 54 Mc. in parts of the southern hemisphere and across the Pacific in the vicinity of the Hawaiian Islands. XE1GE, near Mexico City, found it possible to work LUs as early as last April, and he made more contacts in the fall. By February and March there should be fairly frequent work over this path, and there seems a good chance that even a few Ws may get into the act. In 1957 — well, it's anyone's guess what may be happening by then.

The rising curve of solar activity may bring dividends for 144-Mc. operators, too. Aurora, conspicuous by its absence for the past few years, should be showing up more often, and probably with greater intensity. And though we're not too sure that there is much correlation between sporadic-*E* density and sunspot numbers, there is a good chance that the sporadic-*E* m.u.f. may rise high enough to permit more 144-Mc. DX of that nature than we've seen in the past few seasons.

This much is sure: Amateur work over long paths on the v.h.f. bands during the next few years is a potential source of information of real scientific value. We will have opportunities to justify our existence as something more than mere communicators. Such work can result in never-to-be-forgotten thrills, as well. To try again and again to break down a long path, when you know that there is no more than just a chance that you may make it, and then finally to succeed, is one of the high spots in the life of any good v.h.f. man.

Here and There on the V.H.F. Bands

The Geminid meteor shower, with a peak around Dec. 12th, produced some interesting effects on the v.h.f. bands. W4HHK, Collierville, Tenn., arranged a series of 144-Mc. skeds in the hope of adding a state or two by the meteor route. Tests with WIKCS, Providence, R. I., produced the usual short bursts each way, though not of sufficient quality to permit exchange of much useful information. Similar skeds with W5FAG, Albuquerque, N. Mex., worked out somewhat better. They were close to two-way communication on the morning of Dec. 14th, though not quite enough information was exchanged to qualify the work as a contact.

On the evening of the 12th 50-Mc. signals were reported as having considerably more than the normal amount of meteor-burst characteristics. Stations even less than 100 miles away showed pronounced flutter, and a few contacts were made that appear to have been the result of enhancement of signal strength by meteor reflections. Your conductor worked W4UCH, Sterling, Va., who has not been heard before or since. Tropospheric propagation seemed poor at the time, and the signal sounded much like those received during the Giacobinini-Zinner shower of 1946, except that the effect was noted in 1946 on much more distant stations. The Collins 49.8-Mc. signal was jammed with meteor whistles on the night of the 12th, and during the morning of the 13th, and its average signal level was much higher than normal at several observing points.

W4IKK, Rome, Ga., reports reception of weak phone signals on 50 Mc. the night of the 13th. About ten different signals were heard, all too weak for readable voice, though one was identified as a W5.

2-METER STANDINGS

	Call	States	Areas	Miles	Call	States	Areas	Miles
W1RUF	19	7	1150	W5MMW	9	4	1380	
W1HDQ	19	6	1020	W5ML	9	3	700	
W1REZ	18	5	710	W5ERD	8	3	570	
W1LJW	17	5	920	W5LJK	8	2	580	
W1CCH	17	6	670	W5VX	7	4	1200	
W1IZY	16	6	750	W5VY	7	2	950	
W1KCS	16	5	600	W5ONS	7	2	500	
W1CLH	16	5	565	W5FSC	7	2	500	
W1WZ	16	5	490	W5WZ	7	2	500	
W1AJR	15	6	500	W6WSQ	5	3	1380	
W1AZK	14	5	650	W6DNG	4	2	350	
W1MNF	14	5	600	W6ZL	3	2	1400	
W1BCN	14	5	650	W6BAZ	3	2	320	
W1DJK	13	5	520	W6NLZ	3	2	360	
W1MMN	12	5	520	W6MMU	3	2	240	
W2ORI	26	8	1000	W7VMP	6	4	1280	
W2NLV	23	7	1050	W7LEE	5	3	1020	
W2AZL	21	7	1050	W7JU	4	2	353	
W2BLV	21	7	1020	W7YZU	3	2	240	
W2ZLH	19	7	880	W7JUO	3	2	140	
W2AZP	19	7	950	W7WV	2	2	240	
W2OPQ	19	6	—	W8WVX	28	8	1200	
W2DWJ	19	6	630	W8LPD	24	7	750	
W2AOQ	18	6	660	W8RMH	24	8	800	
W2AMJ	17	5	550	W8SRW	23	8	850	
W2KJW	17	5	510	W8SFG	23	8	850	
W2WFB	16	6	900	W8SVI	22	8	725	
W2PAU	16	6	740	W8VII	22	8	675	
W2PCQ	16	5	650	W8BAX	21	8	685	
W2LHT	16	5	550	W8WRN	20	8	670	
W2IEJ	15	5	620	W8JWV	19	8	710	
W2PQH	15	5	590	W8SEP	18	7	800	
W2RVR	15	5	590	W8ZCZ	17	7	970	
W2FIJ	15	5	435	W8AWW	17	7	630	
W2LBX	15	5	—	W8SWE	16	7	800	
W2DFV	15	5	—	W8EGR	16	6	680	
W3BGT	28	8	740	W9EQC	24	8	820	
W3RUE	25	8	950	W9EHX	24	7	725	
W3KCA	21	7	—	W9FPT	23	8	850	
W3KWL	19	7	740	W9GPV	23	7	1000	
W3KRM	19	7	660	W9KLR	23	7	725	
W3KTH	17	7	600	W9ZHL	23	7	690	
W3GKP	19	6	500	W9WOK	22	8	860	
W3TDF	19	6	720	W9KPS	21	7	660	
W3BNW	18	7	750	W9GJH	21	7	750	
W3FPH	18	7	—	W9GAR	19	7	640	
W3LNA	16	7	720	W9MUD	19	7	640	
W4HHK	28	9	1280	W9REM	19	6	—	
W4AOQ	23	7	950	W9LF	19	6	—	
W4MKJ	20	8	725	W9ALU	18	7	800	
W4PCT	20	8	725	W9VBI	18	6	720	
W4LJW	18	7	830	W9JYJ	15	7	660	
W4VLA	17	7	825	W9BOV	15	7	560	
W4TLV	16	7	1000	W9DSE	15	6	—	
W4UMF	16	6	600	W9DSE	15	6	760	
W4OLK	15	6	720	W9DSE	15	6	760	
W4CLY	15	5	720	W9PAN	14	7	680	
W4ZBU	14	5	800	W9QKM	14	6	620	
W4JIC	14	5	720	W9EWS	14	6	620	
W4WCB	14	5	740	W9EWS	14	6	620	
W4TCR	14	5	720	W9GJZ	14	5	705	
W4UBY	14	5	435	W9BOP	14	5	870	
W4IKZ	13	6	720	W9ONQ	17	6	1000	
W4LJW	13	5	680	W9INL	15	5	830	
W4SOP	11	5	850	W9OAC	14	5	725	
W4UJQ	11	5	500	W9TJF	13	4	—	
W4WNH	10	5	500	VE3DIR	26	8	895	
W4MDA	10	4	680	VE3AIB	22	8	890	
W5RCI	21	7	925	VE3DER	15	7	800	
W5JTL	19	7	1000	VE3BQN	15	7	790	
W5AJG	13	5	1260	VE3PPB	13	6	715	
W5HEH	11	5	550	VE2AOK	12	5	550	
W5ABN	10	3	780	VE3AQG	7	8	800	
W5WJL	10	5	1400	VE3AQG	11	4	900	
W5CVW	10	5	1180	VE7FJ	2	1	365	

K2PJD, Utica, N. Y., found the 50-Mc. band open briefly to North Dakota at 1330, Dec. 11th. K2GRI, near Saratoga Springs, N. Y., and W1UNB, Paxton, Mass., who are on during the day, caught several daytime openings between the 10th and 15th, and several W1s worked W4s and W5s on the 11th. This coincidence of a major meteor shower and the usual December sporadic-*E* openings makes it difficult to sort out the contacts by propagation medium, but it appears quite possible that at least some of the DX reported was of meteoric origin.

A bulletin on the meteor shower and its possibilities was run on W1AW for several days previous to the 12th, in the hope that more v.h.f. schedules would be set up for the period. If reception or two-way work resulting from the meteor shower was done that has not been reported, we'd be glad to hear more about it. We have a third-hand report, for instance, that W2CXY worked W5RCI on 144 Mc. via the Geminids. Were there others?

More prospects for Bermuda DX on 144 Mc.: VP9CL, Hamilton, and VP9CB, St. Davids, began working each other on 144 Mc. in late November. They are presently using low power and simple antennas, but they promise something of DX proportions before spring.

And for still greater DX — G2ADZ says that his bid (Dec. *QST*, page 100) for transatlantic skeds has so far brought just one American reply. He wonders if nobody in this country is interested in trying to cross the Atlantic on 144 Mc. Who's to say it can't be done?

V.h.f. and u.h.f. — Russian style: Bands are now available to Russian amateurs at 38 to 40 Mc., 190 to 195 Mc., 1470 to 1520 Mc. and 5650 to 5850 Mc. Obtaining permission for the construction and operation on the "ultrashort waves" is somewhat involved, and a maximum input of 10 watts is allowed. Ciphers call six characters are assigned to these stations. This information is from a translation of an item in the Russian journal, *Radio*, by W8FAZ.

Addition to list of stations ready to try ionospheric scatter communication on 50 Mc.: W2WFB, Ithaca, N. Y., 1-kw. final, stacked-Yagi array in the works. Will welcome stations with stations at suitable distances from Ithaca.

Interest in 144 Mc. is growing in West Texas. The Dec. 12th meeting of the Terry County Radio Club was devoted to a 2-meter discussion, with talk and demonstration by W5SNX and KN5BDX of Slaton. West Texas amateurs would like to coordinate their v.h.f. efforts with other 2-meter enthusiasts in the Northern Texas Section.

Evidence of rising m.u.f.: K6EDX, Fresno, Cal., has been checking daily since about November 1st, and in that time he has heard the radio paging service in New York on 36 Mc. regularly. Reception is between 0900 and 1400 PST. Many other signals from eastern and middle-western stations are heard up to 38 Mc. or so. Teletype, not identified, is heard from the east and southeast as high as 44 Mc. An ionospheric-scatter circuit, apparently in the Hawaiian Islands, is heard S-9-plus on 43 Mc., peaking at around 1400 PST. With commercial and other signals running this high, can 50-Mc. *F2* openings be far behind?

The Ski-Rack Special for 144-Mc. Mobile

Results with cross-polarization in 2-meter mobile vary with the terrain between the mobile and the fixed station. In hilly country like that in western New England it is difficult to tell, when working mobile, whether the station at the other end is horizontal or vertical. In flat open country, however, the use of a vertical whip in working a horizontally-polarized fixed station is something less than satisfactory. And in any kind of terrain, the signal-to-noise ratio with horizontal-to-horizontal is much better than with vertical-to-vertical.

The problem of mounting a horizontal mobile antenna can be solved in many ways, and we have shown several in *QST* in recent years. The one in the accompanying photograph has the advantage of being readily demountable, yet it is up in the clear and is ruggedly built. The work of W1DXE, it has proven its worth again and again, particularly in the family-affair 2-meter QSOs between W1DXE and W1VLH/mobile. W1VLH travels northwest from West Hartford frequently, the route taking him into the foothills of the Berkshires, rough country for v.h.f. mobile coverage. Working with the home station, W1DXE, he has had ample opportunity to learn just where mobile reception drops off below the usable level, when using a vertical whip.

With the ski-rack mounted horizontal dipole shown the two-way working range has been extended at least 25 per cent, and the quality of the signal at the intermediate distances has been vastly improved. Ignition interference, particularly that from other cars, is greatly reduced, compared to vertical whip reception, and the audio distortion that is experienced at normal highway speeds is almost wholly lacking. Modulation is easier to read at any distance where the signal can be heard.

Construction of the antenna is obvious from the photograph. The vertical support is $\frac{1}{4}$ -inch brass rod about 19 inches long. A small plate, which can be either metal or insulating material, is fastened to the top of the rod, and on this the dipole is mounted with small cone standoff insulators. The dipole is fed with 52-ohm coax directly. This is "against the law," but at approximately a quarter wavelength above the car top it appears to work very satisfactorily with no balancing device.

Directional effects from the dipole? Possibly in open ter-

rain there would be objectionable drop-off in signal level when the dipole is end-on to the station being worked, but it has not shown up that way in the Connecticut hills. Should directional characteristics be troublesome, the dipole could be bent into a circle.

How Not To Use Long Yagis

Having followed the work of W2NLV and W6QKI with long Yagi arrays closely for the past couple of years, your conductor jumped at the chance to try a large in-line recently made available to 2-meter men. The array tested was an unusual design, about which we hope to have more to say editorially in the near future. It is of general interest in that it achieves high performance through a somewhat different approach than that described by Kinozuka and Johnson in their fine report on long Yagis in January *QST*. It is nearly 28 feet long, and has 15 elements in line. The manufacturer claims better than 16 db. gain over a dipole, and it undoubtedly is capable of that.

The manufacturer also states in his brochure that the array must be erected in a completely clear space, at least 20 feet above the ground plane. Take it from your conductor — he means it!

At WIHDQ the array was erected originally on a test support, about 25 feet above ground. This was by no means an ideal spot, as the long boom brought the ends of the array near to a guy wire, an aluminum rain gutter and two trees, at various points in its rotation. Even so, the long Yagi showed a receiving gain of 12 db. over a comparison dipole that was somewhat more favorably situated. At this rate it looked like a very good bet for installation atop our 60-foot tower.

But to be used there it would have to go in between the two bays of a 3-over-3 6-meter array. As these bays were stacked 12 feet ($\frac{1}{4}$ wavelength) apart we hoped that there would not be serious interaction. The monster was finally jugged into place between the 6-meter bays, and we could hardly wait to hear the S9-plus DX rolling in on 2.

We never heard it. The long Yagi showed hardly any gain over the comparison dipole! The pattern, which had been remarkably clean on the temporary support, was now cluttered with large minor lobes, and the array was useless. Later it was turned at right angles to the 6-meter booms, but still no gain resulted.

The array has since been installed by another 2-meter man locally, in this case 12 feet above a 6-meter beam, but otherwise quite well clear of obstructions. A pattern check shows slightly lopsided minor lobes somewhat larger than the manufacturer's literature, but not at all bad. No comparison antenna was available at this location, so no direct check on gain has been made, but indications are that the array is doing a very satisfactory job.

Just a word about "aperture" or "capture area" in connection with these long arrays. Even though its frontal



Ski-rack mounted horizontal dipole for 2-meter mobile work built by W1DXE.



W9JJB	.48	W4FLW	.43	W8SQU	.43	
W9BJV	.48	W4CPZ	.42	W80JN	.43	
W9CJS	.48	W40XC	.41	W8LPD	.42	
W9CJW	.48	W40XZ	.49	W8YLS	.41	
W9ZHL	.48	W4FNR	.48			
W9OCA	.48	W4I4U	.38	W92HB	.48	
W6OB	.48	W4BEN	.35	W9QUV	.48	
W9INI	.48	W5PSF	.44	W9HGE	.47	
W1HDQ	.48	W5VY	.48	W9VZP	.47	
W9VZP	.48	W55FW	.47	W90HJ	.47	
W2IDZ	.48	W5GNQ	.46	W9ALU	.47	
W1LLL	.48	W50NS	.45	W90KM	.47	
W0DZM	.48	W5JTL	.44	W9U1A	.45	
W9HVV	.48	W5ML	.44	W9UN8	.45	
W1GJO	.47	W5PSV	.44	W9MFH	.40	
W1CLS	.46	W5JME	.43	W9QIN	.47	
W1CGY	.46	W5VW	.42	W9NFM	.47	
W1LSN	.45	W5FAL	.41	W9TKX	.47	
W1DJ	.41	W5HIZ	.41	W9RYF	.47	
W1PDU	.41	W5EJD	.40	W9VOL	.47	
W1SPX	.46	W5FXN	.39	W6JOL	.46	
W1FOS	.32	W5NSJ	.24	W8MVG	.46	
W1WAS	.23	W5ZVF	.23	W9TJF	.44	
W2MEU	.47	W6WNN	.48	W9URQ	.44	
W2AMJ	.46	W6ANN	.45	W9JHS	.43	
W2BYM	.46	W67MI	.45	W9PBD	.43	
W2RLV	.46	W61WS	.41	W91PI	.44	
W2FHJ	.45	W6ABN	.35	W90RE	.37	
W2GYV	.40	W6GCG	.35	W9USQ	.36	
W2QVH	.38	W6BVG	.35	W8V1K	.34	
W2WV	.39	W6BWW	.35	W9FKY	.32	
W2ORA	.33	W7HEA	.47	VE3AET	.44	
K2AXQ	.32	W7ERA	.47	VE3AIB	.35	
K2JNS	.30	W7BQX	.47	VE1QZ	.34	
W3OJU	.46	W7FDJ	.46	VE1QY	.34	
W3TIF	.42	W7FJD	.43	VE3ER	.31	
W3NKM	.41	W7JRC	.44	VE1ER	.31	
W3MQU	.41	W7ACD	.43	XE1GE	.36	
W3OTC	.40	W7BQC	.42	CO6WW	.21	
W3KMY	.39	W7FIV	.41	Calls in bold face are holding a special 50-Mc WAS certificates listed in order of award numbers. Others are based on unverified re- ports.		
W3TE	.38	W7CAM	.40			
W3MZW	.38	W8NSB	.46			
W3LFC	.37	W8CMS	.46			
W3FPH	.35	W8NQD	.45			
W4FBH	.46	W8RFW	.45			
W4EQM	.44	W8LPD	.44			
W4QN	.44					

area is small, a properly tuned long Yagi has a very large capture area. Other antennas or wires within a radius equal to about half the boom length are almost certain to impair its effectiveness. By the same token, stacking of long Yagis is a rather discouraging proposition. Very large spacings between bays must be employed, if any real gain is to be achieved. But that's another story, about which we hope to have more at a later date.

OES Notes

We owe W4IKK an apology for an error in the printed report of his work with pentode r.f. stages that ran in this space in December *QST*. Bill's experiments were with 50-Mc. r.f. stages, but we wrote it up as 144 Mc. This was a pure slip of the typewriter on your conductor's part. We knew that the work was done on 50 Mc. and intended to report it as such.

W1HDQ, Canton, Conn. — Results of 50-Mc. ionospheric scatter tests very encouraging. W4HHK, Collierville, Tenn., 1020 miles, heard a fair percentage of every test transmission made thus far. Best results are on morning transmissions (0830, 0840, 0850, 5 minutes each, 50,005 Mc., c.w., 400 watts output) with the signal audible better than 75 per cent of the time. Peaks are up to 89, and c.w. is readable if repeats are made. W4IKK, Rome, Ga., and W4LNB, Atlanta, both about 850 miles, also hear the signal, though apparently not as well as W4HHK. Would like to recruit listeners at 700 to 1300 miles for these or other skeds. Two-way skeds also desired.

Tropospheric scatter tests with W3OJU, Washington, D.C., showed that consistent contact was possible. W3OJU runs less than 100 watts input, but uses 4-over-4 array in better-than-average location. Though scheduled tests are

concluded, W1HDQ will continue to CQ on c.w., toward Washington area nightly at 2245, whenever possible, for other stations to attempt contact. W4UCH, Sterling, Va., and W3KMF, Chevy Chase, Md., have been worked at this time, in addition to W3OJU.

K6LRN, Liverpool, N.Y. — New 6-meter rig with parallel 6146s in final delivers 100 watts output. Constructed low-s.w.r. v.h.f. dummy load, using 20 2-watt resistors paralleled in copper box. Tests with new ceramic triode 6BY4 show tube inferior to miniature types at 220 Mc. and lower, but it appears to have excellent possibilities for u.h.f. amplifier service. Activity on both 6 and 2 in Syracuse area on upgrade. Six-meter gang now includes K2s GEF GEI LIJ EPH OVH QKU, W2s UFI RHQ EMW HNH and W3ZGH/2.

W3GKP, Silver Spring, Md. — VFO with stability sufficient for T9 signal on 144 Mc. is achieved by running a Collins 70E-8 VFO unit and its following buffer stage on 1780 kc. with storage battery heater supply on the 6837 and GAC7. This is followed by four triplers, the first of which is keyed. VFO is warmed up one hour before use, and is left on continuously thereafter. At such a low frequency it does not interfere with reception.

W4LNG, Atlanta, Ga. — Opposed to present crowding of DX work at 144 Mc. Frequency at low edge has no propagation significance, and it wastes desirable passband characteristics in crystal-controlled converters on the aircraft band below the edge of the amateur band. If we must crowd a frequency, 145,000 would make much more sense. Beams and converters could be peaked to favor this frequency without sacrificing bandpass, and it would give the Novice a chance.

W5NSJ, Albuquerque, N.Mex. — Experimenting with transistorized radio-control receiver on 54 Mc. 1A4G detector feeds 2N107s in audio and relay stages. 5-microvolt signal 50 per cent modulated closes control relay.

W5TIA/5, Fayetteville, Ark. — Activity on 50.1 Mc. includes writer W3s WHU/5 BIJ/5 UEB OXL and JBU. Usually on at 1230 and 1730. Mobile to mobile work done at distances up to 30 miles, using vertical whip and 25 watts input at each end.

W60RS, Alhambra, Cal. — Mountains provide bounce points for 144- and 220-Mc. communication as far away as San Diego, 170 miles. Polarization vertical.

W7JHX, Port Orchard, Wash. — Completed work on sync generator and blanking unit for TV rig.

W8NAF, Dayton, Ohio — Use of m.c.w. on 144 Mc. provides excellent code training for Novices. M.c.w. net now in operation in Dayton area.

W9DRN, Des Plaines, Ill. — Had to reduce power on 432 Mc. by 50 per cent, to comply with new regulation, but seem to be doing about as well. Converting final from doubler to straight amplifier will restore power output to near original value. Operation on 432 Mc. each Thursday at 2100.

W9KLD, Kankakee, Ill. — As check on possibilities of 144 Mc. with low power, have kept regular sked with W9NSK, at a distance of 43 miles. Power used is 15 watts input at both stations. Antenna at W9KLD is 5-over-5 made from cut-down Channel 5 Yagis. W9NSK has 3-over-3. Signals are solid on voice, in all weather.

W9MHP, Indianapolis, Ind. — New 5-over-5 for 50 Mc. recently erected provides much better range and signal strengths than 3-element job it replaced.

W9QLU, Cedar Rapids, Iowa — Mobile on 220 Mc. showing up well. W9NRW, with 1 watt antenna power and quarter-wave antenna on car top, puts in good mobile signal over 17 miles of hilly terrain.

Notice to all OES appointees: Once again we point out that OES is a *v.h.f. only* appointment. You must be active on one or more v.h.f. bands to qualify for it. This does not, of course, prevent you from working other bands as well — but please do not report low-frequency work on OES report forms. It wastes everyone's time, including yours.

ARE YOU LICENSED?

• When joining the League or renewing your membership, it is important that you show whether you have an amateur license, either station or operator. Please state your call and/or the class of operator license held, that we may verify your classification.

Results—1955 W/VE Contest

Final results of the W/VE Contest of last September 24th and 25th have been received from the Montreal Amateur Radio Club, sponsors of the affair. Many regulars in the ARRL Sweepstakes and DX Contest were active in this annual "across the border" funfest. Canadian winner Thain MacDowell, VE2NI, racked up 68,400 points, 381 QSOs, 45 sections, using a Lysco rig at 30 watts input and a 75A-1 receiver. He received the trophy, pictured on page 58, September 1955 *QST*, in a special MARC Christmas party on December 14th. In the U. S. A., W8AJW set the pace with a score of 20,541. The Contest Committee, consisting of VE2ACA, VE2BB and VE2DY, states that the first-listed station in each ARRL section in the tabulation below will soon receive a certificate. The figure following each call indicates final score.

<i>E. Pennsylvania</i>		<i>Ohio</i>	<i>Oregon</i>	<i>New Mexico</i>	
W3TYW	10,686	W8AJW	20,541	W8VRP	12,969
W3AIZ	7892	W8SMK	11,548	VE1ER	34,223
W3WKX	7679	W8SWZ	4266	VE1VW	20,498
W3MDO	5546	W8MQQ	2986	VE1AEE	11,516
W3ZRQ	4266			VE1DB	11,550
W3VW	237	K2HZD	7807	VE1OM	2280
W3SOH	1209	K2EDH	6470		
W3YHX	1138	K2FJN	6371	<i>Quebec</i>	
<i>Md.-Del.-D. C.</i>		W8RCH	5759	VE2NL	68,400
W3HVM	10,750	K2DIM	5859	VE2BN	54,162
W3WZL	9385	W8AVT	1280	VE2DR	43,465
W3DKT	4678			VE2ST	33,700
W3WQZ	2752	W2EEN	6271	VE2YA	32,736
W3HJW	208	W2CPA	2304	VE2AQQ	10,989
W3HYY	21	K2HMG	2048	VE2AGG	8556
<i>S. New Jersey</i>		K2KXZ	149	VE2RL	5445
K2CPB	8660			VE2AUR	4631
W2GND	1776			VE2AEQ	4140
<i>W. New York</i>					
W2SSC	19,623	W2EIK	11,945	<i>Ontario</i>	
W2QBB	3683	K2ZEP	11,406	VE3BXF	53,250
W2REL	2645	K2EFP	7821	VE3BHS	50,820
W2KJL	5	K2KDP	6526	VE3QH	49,425
W2MTA	1231	K2KFP	6399	VE3DSQ	43,560
W2CZC	1024	K2KDW	6143	VE3DSU	40,376
K2EVP	683	K2LRO	5333	VE3BN	39,928
<i>W. Pennsylvania</i>		K2HBO	4210	VE3ES	3697
W3GJY	5225	W2NIV	4143	VE3BRNQ	27,512
W3KUN	4949	K2JYS	2527	VE3BHQH	27,213
W3VKD	3484	W2EQS	2389	VE3AVS	26,360
W3KQD	1088	K2IBF	1422	VE3DIL	23,936
<i>Illinois</i>		K2CCF	1088	VE3M1	21,783
W9KLD	12,627			VE3BNS	21,313
W9PZT	12,286	K0AZJ	5261	VE3BU	10,998
W9YYG	5375	W8NPF	5077	VE3GI	8910
W9CLH	1792	WBVFM	1138	VE3ASV	3480
W9CNF	1692			VE3DNR	1248
W9VW	164			VE3AUU	512
W9MAK	1290				
W9ASK	1194			<i>Saskatchewan</i>	
W9JGV	725			VE5DZ	15,933
W9ALO	640				
<i>Indiana</i>				<i>Alberta</i>	
W9UKG	17,064			VE6NX	18,816
W9LGX	14,494			VE6IZ	7000
W9IOT	407			VE6AJ	4133
W9FZR	2218			VE6SX	3150
W9SWR	1854			VE6GX	2664
<i>Wisconsin</i>					
W9GWK	16,723			<i>British Columbia</i>	
W9WEN	12,841			VE7LE	10,260
W9BVG	9726			VE7JO	3240
W9W	8873			VE7CE	1738
W9DIR	8033				
W9HKK	5119				
W9HCC	569				
W9YOS	455				
<i>Minnesota</i>					
W9VBS	3683				
W9YCR	3626				
W9QZR	1067				
<i>Louisiana</i>					
W5KC	1621				
W9APY/5	13,310				
<i>Tennessee</i>					
W4TJI	3669				
<i>Kentucky</i>					
W4OMW	5663				
<i>Michigan</i>					
W8KPL	7338				
W8PFT	4266				
<i>Maine</i>					
W1VEH	1557				
<i>W. Massachusetts</i>					
W1JYH	5276				
<i>New Hampshire</i>					
W1FZ	10,900				
W1ARR	5972				
W1QGU	3306				
W1DYE	1365				
<i>Rhode Island</i>					
W1VBR	2773				
<i>Vermont</i>					
W1UGW	10,366				
W1QMM	7963				
<i>Montana</i>					
W7UGZ	2199				

* Labrador certificate winner.

While chasing Canadian amateurs in the contest, Tony Rogers, W3BFW and son of U. S. Deputy Attorney General William P. Rogers, had distinguished company. It was September 24th, the date of President Eisenhower's heart attack, and Vice-President Richard M. Nixon had dropped over for some peace and quiet and conversation with Tony's dad, a long-time friend. Afterwards when Nixon tried to grab forty winks, it seems that he was kept awake by assorted noises from W3BFW's shack. So the 15-year-old not only made the Md.-Del.-D. C. tabulation above, but also *Time*, *Look*, and various other magazines, periodicals and newspapers. Noisy relays, Tony?

Strays

The Jewish Community Center of Indianapolis kept regular contact with its summer camp in Zionsville, Indiana, by ham radio during the summer season. Center director W9RGM set up a nightly 80-meter c.w. schedule with the camp, where Stanley Goldberg, one of the counselors, had a portable rig set up. W9RGM and the camp director were thus able to exchange reports and other information; a by-product of the arrangement was a series of radio lessons at the camp by Goldberg, which resulted in six new Novices among campers and staff members.

YL NEWS and VIEWS

BY ELEANOR WILSON,* W1QON

Amateur radio is many things to many people — a truism we often hear. The two YLs whose photographs appear on this page are glad to tell what amateur radio means to them, for they hope that others in similar circumstances may also realize the interest and pleasure they have experienced since becoming amateurs.

Jean Heikkila, W0IRJ, of Cromwell, Minnesota, writes:

"I have been a ham since 1952, when I started with a novice ticket after listening for several years. I find ham radio an excellent hobby, for I am confined to a wheel chair by muscular dystrophy. A group of wonderfully helpful local hams keep my Viking II and HQ-140X in good operating condition and have even wired my rig for remote control operation, allowing me to operate from my bed. My license has enabled me to travel to all corners of the earth and to make a world of new friends from all walks of life. No longer are there weary hours of nothing to do and nothing to think about. Now it is impossible to imagine how I got through one long day after another without my station."

Betty Wilson, W6REF, of Oxnard, California, has been confined to a wheel chair since 1948, when she was stricken with polio. Betty's activities since 1951 when she received her first license, W7PTC, would fill a page. Interested mainly in traffic handling, she has been an active member of seven nets. In 1953 she received a Public Service award for handling messages during the floods in Northern California. An ORS and RM, she has a Code Proficiency Certificate for 25 w.p.m. and several traffic certificates. As Secretary of the Mission Trail Net, she is the first YL to hold office in that organization. She is employed as a bookkeeper in a local airport office, and in her "spare" time she conducts code classes and builds some of her own equipment.

That amateur radio means much to Betty and

* YL Editor, *QST*. Please send all contributions to W1QON's home address: 318 Fisher St., Walpole, Mass.



W6REF

Jean is obvious. The situation is reciprocal though, for the enthusiasm and cheerfulness and courage of the girls inspire all who meet them.

We regretfully add a postscript to the above. Word has come of the passing of Patt Parks, W5TTU, of Rotan, Texas. Patt loved amateur radio and people, and in spite of chronic invalidism for years, she thought only of doing things for other people. A tribute to Patt's contribution to our world may be found in the words of W5SYL, a devoted friend — "Always we listened for W5TTU."

DXCC YLs

Last year only W1RYJ was added to our list of YLs who are members of the DX Century Club. This year five made the grade: W2FZO, W3WUH, W9QLH, KZ5DG, and ZS6WJ. The four girls who have worked the most countries are also the ones who upped their totals over last year.



While using her old call, LU4MG, Maria de Dantiacq, Buenos Aires, had 151 countries confirmed in 1949-1951. Mary now has 178 countries confirmed on phone under her present call, LU4DMG, issued in 1951. The only YL in Argentina on c.w., she is also working for DXCC on c.w. only. LU8DMC is Mary's OM.



Contacts on ten phone only have given W2PBI, Jerry Weinberg of N. Y. C., DXCC (113), WAS, WAC, BERTA, and WBE. Jerry's OM, W2YYL, also holds the same certificates, with all contacts made on ten phone too.



W3WUH, Constance Hyden, is one of the newcomers to the list. With 108 countries confirmed on phone and c.w., Connie awaits a few more confirmations to make DXCC on phone too. A high-school senior, Connie has done her DXing on 20 mainly, but she "would go on any other ham band if [I] could work a new country." Her Dad is W3IMV.

W1MCW, long our leading DX gal, was up 5 to 219 countries worked, on phone only. EA2CQ, up 13; LU4DMG up 28; CO2BK up 30, are all in the phone only class, too. W1FTJ also added 14 to her total, phone and c.w. All others maintained the same standing as last year.

Phone only: W1MCW 219; EA2CQ 203; LU4DMG 178; CO2BK 160; W9QLH 137; W2PBI 113; W8BFQ 110; KZ5DG 101; W2FZO 100; OE5YL 100.



Phone and C.W.: W6UHA 201; W1FTJ 134; W4ITR 123; W6YZU 120; W5UCQ 116; W2NFR 115; ZS6WJ 112; ZS6KK 109; W3WUH 108; KZ5DG 105; G3ACC 100; W1RYJ 100.

YLs You May Have Worked

In little more than a year, after starting as a novice, W5EGD, Lillian Beebe, has WAS, WAC, and 62 countries confirmed. A member of the South Texas Emergency Net and the Texas YL Round-Up Net, she works 20, 40, and 80, phone and c.w. Lillian is married to W5DIW, an FCC inspector.

After twelve years of exposure to amateur radio, Ila Jennings decided to try for herself and came up with the call KN6MHU. She liked what she found and worked hard enough to drop the novice "N". Ila's OM, W6EI, was so pleased with her efforts that the use of DX100 and 75A4 and a KW mobile rig were her reward. Ila is on 40 and 80 c.w. from her San Jose QTH.

(Continued on page 138)



K6MHU

CONTEST PERIODS

Phone: Starts: Saturday, March 3, 1956, at 1:00 P.M. EST.
Ends: Sunday, March 4, 1956, at 12:00 midnight EST.

C.W. Starts: Saturday, March 17, 1956, at 1:00 P.M. EST.
Ends: Sunday, March 18, 1956, at 12:00 midnight EST.

Seventh Annual YL-OM Contest

(Conducted by the Young Ladies Radio League)

Eligibility: All licensed OM's and all licensed YLs and XYLs are eligible.

Operation: All bands may be used. Cross-band operation is not permitted.

Procedure: Call "CQ YL" or "CQ OM."

Exchange: QSO number, RS or RST report, and state, U. S. possession, VE district, or country should be exchanged.

Scoring: (a) One point is earned for each station worked (YL-to-OM or OM-to-YL *only*). Phone and C.W. contest will be handled as separate contests. (b) Stations and multipliers will count only once in each contest . . . example: a station contacted on phone may be contacted in the C.W. portion of the contest for additional credit. (c) Add number of points and multiply by number of different states, U. S. possessions, VE districts, and countries worked. (d) All phone contestants running 150 watts input or less at *all times* then may multiply final score by 1.25. (e) All c.w. contestants running 150 watts input or less at *all times* then may multiply final score by 1.25. (f) Maryland and District of Columbia count as one state.

Logs: Copies of phone contestants' logs must be postmarked not later than April 1, 1956; copies of c.w. contestants' logs must be postmarked not later than April 10, 1956. Logs should be sent directly to Gloria Matuska, W9YFBC, 2322 South Second Avenue, North Riverside, Illinois.

Awards: A silver cup will be awarded to the highest YL scorer and to the highest OM scorer. The highest score can be a combined total of c.w. and phone scores, or it may be either a c.w. score or a phone score. Gold cups will be awarded to first and second place scorers, YL and OM, phone and c.w. Winners of silver cup awards are not eligible for gold cup awards, i.e., if the highest scorer also has the highest phone or highest c.w. score, then the gold cup for first place phone or c.w. will go to the contestant with the second highest phone or c.w. score. Cups are awarded on a yearly basis, with a three time winner obtaining permanent possession. All winning contestants will receive a certificate. The highest scoring contestant in each district will receive a certificate.



W5EGD

22nd International ARRL DX Competition

Phone: Feb. 10th-12th, Mar. 9th-11th;
C. W.: Feb. 24th-26th, Mar. 23rd-25th

DX Test time is almost here, and whatever your locale, you're urged to participate on phone or c.w. or both. Two weekend periods will be devoted to c.w., two to phone participation. Each of the four periods begins on Friday at 7 P.M. EST and ends on Sunday at 7 P.M. EST on the dates shown above.

Certificate awards will be given to the highest-scoring c.w. and phone operator in each country and in each continental U. S. A. and Canadian ARRL section. And then there will be the special certificates for club leaders and multiple-operator competitors and a gavel to the top club.

Those outside the U. S. and Canada will try to trade contest information with as many W (K) and VE/VO stations as possible. U. S. and Canadian amateurs will transmit RS or RST reports *plus states or provinces*. Returns from the DX, though, will be the usual 5- or 6-digit numbers indicating signal reports and powers input.

Free contest report forms are now available from the ARRL Communications Department upon request. These will facilitate preparation of your log for submission, but are not required by the rules. If you request these forms, please advise us whether you expect to enter the c.w. section, the phone section, or both.

You can be choosy and scout only new countries to fatten DXCC totals, or you can go out for your section award by chasing all comers. In the latter case, thumb through the results of the last DX Test (October, 1955, *QST*) to get an idea of your local competition. And by all means scan the rules in January, 1956, *QST* to learn the pattern of this year's contest. Fifteen meters should be "hot," so let's have some Novice entries too. Good fishing to everyone, whether newcomer or old timer, in February and March!

Strays

This is the accomplishment of Jerry Johnson, W8TJV, whose home is in Glenwood Park, near Princeton, West Virginia. Jerry received his Novice license September 14, 1954. He received his General license on November 29, 1954, and his Second Class Radio telephone Commercial license April 7, 1955. He was awarded his First Class Radio telephone Commercial license on October 12, 1955. The entire time consumed from Novice to First Class Commercial was

only a little more than a year. But, the special significance of this is that Jerry is now just thirteen years old!

Add unusual calls — K6BLF, that of C. W. Hash, Fort Ord, California.



Johnnie Fearon, W4WKP, 11-year-old Atlanta, Ga., boy, blind since birth, on November 23, 1955 became the youngest MARS operator in the world. He is shown above at the controls of the Fort McPherson, Ga., radio station, as Capt. Donald Worth, Jr., W2JJW (left), Third Army MARS Officer, and Col. A. R. Morley, Third Army Signal Officer, look on.

(U. S. Army Photo)

Silent Keys

IT is with deep regret that we record the passing of these amateurs:

W1MY, Donald C. S. Comstock, Somers, Connecticut

W1NUN, Murray H. Barchard, Bangor, Maine

W2QEN, Frank H. Wood, Salem, New Jersey

W3ATR, Charles J. Schroeder, Philadelphia, Penna.

W3MUZ, Donald Mook, Rouseville, Pennsylvania

W3ZZD, Maurice B. Bernhard, Towson, Maryland

W6AHU, Bardaley Whiting, San Francisco, California

W6ODR, Robert Bowen, San Diego, California

W7VCK, Leland W. Sturdevant, Wedderburn, Oregon

W7YHA, Duane E. Names, Kelso, Washington

W8NDA, Arnot P. Foster, Cincinnati, Ohio

W9ICS, James R. Bailey, Barrington, Illinois

W9QQ, John O. Weaver, Christopher, Illinois

W9PZP, Walter A. Helm, Falls City, Nebraska

W9UW, Homer G. Heidt, St. Paul, Minnesota

W9YUN, Clyde N. Green, Minneapolis, Minnesota

CX1AH, Jose P. C. Viera, Montevideo, Montevideo

KH6BFQ, Louis A. Carvalho, Hilo, Hawaii

KL7BKO, William L. Harnack, Jr., Anchorage, Alaska

KN4BYV, George Jenkins, South Hill, Virginia

ex-LU3DE, Geronimo Chescotta, Buenos Aires, Argentina

VE3BSQ, J. Harold M. Enright, Belleville, Ontario, Canada

VE3BUS, Jack Rumball, Lockerby, Ontario, Canada



Correspondence From Members-

The publishers of *QST* assume no responsibility for statements made herein by correspondents.

40TH ANNIVERSARY ISSUE

4209 N. Hyland Dr.
Dayton 4, Ohio

Editor, *QST*:

Congratulations on our 40th birthday. The December issue with the reprint is wonderful.

— *D. L. Marquette, WSDHJ, Treas.
Dayton Amateur Radio Assn., Inc.*

P. O. Box 278
Rochdale, Mass.

Editor, *QST*:

The December issue of *QST* is really TOPS — the best ARRL has ever put out. Very nice work . . .

— *Alan D. McKerrow, W1SPF*

77 Reservoir Road
Kensington, Conn.

Editor, *QST*:

The December *QST* with the anniversary reproduction of the first issue was FB.

— *William L. Miller, W1ESS*

62 St. John's Road
Pointe Claire, Que., Can.

Editor, *QST*:

Many happy returns on *QST*'s anniversary and congratulations on a very fine December *QST*.

— *C. Bill Skarstedt, VE2DR*

Al Paul Lefton Company
71 Vanderbilt Ave.
New York 17, N. Y.

Editor, *QST*:

Your December, 1955, issue of *QST* is fabulous. . . .

— *Linwood G. Lessig
Director of Technical Advertising*

842 Tuxedo Blvd.
Webster Groves 19, Mo.

Editor, *QST*:

Say, wasn't that December issue a pip?

— *W. J. Bergmann, W0AUB, Secy.
S. Louis Amateur Radio Club*

Chief, U. S. Weather Bureau
Washington 25, D. C.

Editor, *QST*:

We have noted the article on U. S. Weather Bureau reporting procedures in the 40th anniversary reprint of the first issue of *QST*. We believe the item will be of interest to the many employees who have joined our organization since this early day, as well as the "old-timers" who are still with us or manage to keep in touch with the Weather Bureau. For that reason, we would appreciate having your permission to reprint the item in our house organ, *TOPICS*.

— *George C. Allen
Editor, TOPICS*

St. Raphael's Church
Dubois, Indiana

Editor, *QST*:

The insert copy of Number One *QST* dated four years ago is most interesting and enlightening. Being a little past the half-century mark in age, I was born a little too late to enjoy loose couplers, crystal detectors, rotary spark gaps, and the first audions. It is evident that the old-timers did a bang-up job those many years ago, and it must be conceded, too, that amateur radio has made great progress because of the ingenuity and inventive ability of its members. . . .

— *Rev. Joseph Tersieg, W9LQE*

5th & Kostner Aves.
Chicago 24, Ill.

Editor, *QST*:

Congratulations on the latest *QST*. I got a special kick out of the reprint even down to the Jove Detector (one of which I owned as a young ham). It was really a wonderful issue. Keep up the good work.

— *W. J. Halligan, W9AC
The Halliganers Co.*

58 Throop Ave.
Auburn, N. Y.

Editor, *QST*:

I have been reading *QST* for exactly a year now, and to my mind, this 40th anniversary issue has been the best to date. Not only was it larger than usual but the articles inside were fine.

However, I have been wondering about something: How is it possible to find a cover better than this one for the 50th anniversary issue? It is interesting to note the change of cover design and colors over the years. When I receive my *QST* each month, it is so new, so glossy, so very FB, that I feel that I must either put the issue in deep-freeze to preserve it, or else go out and buy another copy.

Again, many thanks for a really nice year of membership in the ARRL. If one is looking for a reason that people continue to renew their membership year after year, it is the fine job done on each issue of *QST* that is really the incentive.

— *George Hippisley, Jr., K9KIR*

P.S. Wonder if that three-month trial offer for *QST* for January, February and March 1916 still holds? HI.

1413 Valencia Rd.
Schenectady 9, N. Y.

Editor, *QST*:

We all join in sending you folks at Headquarters our congratulations on the 40th anniversary of *QST*. It is a wonderful magazine for radio amateurs. We wish *QST* and its staff every success in the future years to come!

— *Bob Burnett, W2YIV, Pres.
Schenectady Amateur Radio Assn.*

10052 Sheldon Dr.
St. Louis 15, Mo.

Editor, *QST*:

Just a line to let you know that I am thrilled no end over the 40th anniversary December 1955 issue of *QST*. A wonderful job for which you and the gang at Headquarters deserve a lot of praise.

— *Earl R. Linder, W0DZG*

Box 148
Wood River, Nebr.

Editor, *QST*:

I want to say I really enjoyed your 1915 issue of *QST* in the December 40th anniversary issue. Wish I had been in the radio game at the time. Where can a feller get more literature on spark transmitters? . . .

— *Thomas J. Millette*

999 Middle Rd., RFD 2
Oneida, New York

Editor, *QST*:

QST for December a masterpiece. Congrats!

— *N. J. Harrington, K2DYB*

Box 85
Lanesboro, Mass.

Editor, *QST*:

It seems to me that more than one ham must have wondered what was inside when he first noted the hefty De-

(Continued on page 126)

Operating News

F. E. HANDY, WIBDI, Communications Mgr.
GEORGE HART, WINJM, Natl. Emerg. Coördinator
PHIL SIMMONS, WIZDP, Asst. Comm. Mgr., C.W.

ROBERT L. WHITE, WIWPO, DXCC Awards
LILLIAN M. SALTER, W1ZJE, Administrative Aide
ELLEN WHITE, WIYYM, Asst. Comm. Mgr., Phone

The ARRL DX Competition. In getting into the DX test, use the abbreviation for your state or province given with the announcement (last *QST*). It will give you maximum assurance of being understood through QRM. Advance notice was sent to all overseas societies and the high popularity of this contest with DXers completing states-for-WAS and provinces-for-WAVE seems bound to continue. The 10-, 15- and 20-meter bands will be high producers this year. We hope the competition will help you add to your DX country totals, whether you follow DX regularly or just plan to knock off some and renew DX acquaintances during this highlight of the operating season. Don't forget the dates as given in the Contest Time Table (January *QST*). This is February 10th-12th (phone) and February 24th-26th (c.w.), also the corresponding week ends of March 9th and 23rd respectively for completing phone or c.w. lists. Best luck and DX.

DX Operating Code. The annual DX fray certainly is a suitable occasion for us to emphasize briefly the importance of making calls *short* and interspersed with listening periods. This makes for highest operating efficiency for everybody. Also it's a very good idea in DXing to make QSOs reasonably short, even at times other than in the contest, when the DX is rare. Courtesy and efficiency go hand in hand. For a more complete list of pointers and recommendations we suggest for all DX-interested amateurs *not* having this item to send us a postal card or radiogram requesting ARRL Operating Aid No. 5 . . . data for W/VE's on one side, and overseas operators on the other.

DX operators overseas can do much to minimize pile-ups by indicating *where they will listen*. This spreads out the replies so effective work can proceed with minimum QRM. By specifying UP TEN or DOWN FIFTEEN as appropriate, for example, the DX station can direct where to be called when this procedure seems to be necessary.

Net Frequency Observance. The new ARRL Net Directory spells out an increasing general interest in efficient net operations throughout the nation. We can all be proud of the number of nets now dedicated to traffic distribution and emergency readiness. Nets of 15 to 20 stations getting together on *one frequency* (when the members otherwise might *each* be using that many individual frequencies) represent high efficiency in the use of frequencies for their usually limited periods of operation. It must be observed, however, that this efficiency is to some degree limited by the care with which every member station

zeros exactly on the registered net frequency. In its *QMN Bulletin*, the Detroit Amateur Radio Association (referring to Michigan's QMN frequency 3663 kc.) urges netters to QNZ (zero beat) the NCS's signal with care. The DARA wonders if we need a new "special" Q signal to mean "I have not been using a coherer for several years, and your signals are well outside the pass band of my receiver."

Speed of Putting it Down Determines Operator Speed. We are a group of men dedicated to developing our communications abilities to the utmost. Speed is something we strive for, but of course never at the expense of accuracy. Accuracy must be paramount if any intelligibility is to be handled without distortion of meaning. In the significant-quotes department here's what *Midwest Clix* has to say about *possible* top speed:

"Where the operation is by voice, c.w., wig-wag or smoke signals, the top copying speed for reliable communications cannot be above what the operator can set down on paper in a manner that will be positively correct when read later on. A man may briefly understand something sent at 100 w.p.m. on voice or even 50 w.p.m. on c.w., but if his ability to put it with accuracy on paper is but 15 w.p.m., he is only a 15 w.p.m. operator."

Auto Call, edited by W3NL of the Washington Mobile Radio Club, points up the need for detailed studies along this and procedure lines in many groups dedicated to handling of emergency communications. If you've ever listened to a circuit manned by someone who never handled a message and noted the errors, repeats and needed fills, sometimes including parts of a message in the wrong order, you will know what Andy, W3NL, is driving at.

"During a recent CD drill the over-all speed of a message handled was noted as less than 3 words per minute, simply because of repetitions, by-play, extra words, etc. Two Novice c.w. operators with moderate training could have bettered this without half trying. The next time you hear a couple of hams handling messages (an idea for RMs and PAMs?) it might be interesting to put your watch on them and figure out the net words per minute. Then you'll know what we're talking about. Thanks to our traffic people in the Club (WMRC) a detailed study was made how to correct late messages and procedures and as a result we had no messages that required more than 20 minutes for delivery on a *following exercise* . . . and some of them were relayed three times."

We concur with expressed sentiments that more tests and/or drills designed for increasing operating efficiency and message handling are called for. Clubs can help by setting up some blackboard sessions and question-answer periods, so old and new amateurs will have the know-how needed.

More FCC Suspensions. These operator license suspensions include a 144-Mc. instance that belies the general feeling of some two-meter men that anything goes in that band and that FCC doesn't monitor there.

FCC ordered (30 Nov., '55) that the Technician Class amateur operator license of William C. Holtz, Chicago, Illinois, BE SUSPENDED for a period of *six months*. This is under the authority of Section 303 (m) (1) (A) of the Communications Act of 1934, as amended and Sec. 0.292 (f) of the Commission's Rules. This action is taken, it appearing, that said licensee on various occasions in the period June 21 to October 27, '55 and particularly on October 27, '55 operated his station W9HXF in the 144-148 Mc. frequency band, contrary to the terms of his radio license and in violation of Section 12.23 of FCC rules.

FCC ordered (30 Nov., '55) that the Technician Class amateur operator license of Paul R. Coleman, Chicago, Illinois, BE SUSPENDED for a period of *sixty days*. This action is taken, it appearing, that said licensee operated his amateur radio station W9HXK in the 144-148 Mc. frequency band, contrary to the terms of his radio license and in violation of Section 12.23 of FCC rules on Sept. 21 and Oct. 27 '55 and on various occasions between June 21 and October 27 . . . it further appearing that said licensee failed to maintain an accurate station log.

FCC ordered (10 Oct., '55) that the amateur operator license of M. R. Martinez, Miami, Florida, be suspended for the remainder of the license term (expiration July 9, '56), that the license be turned in to the FCC and W4JAV not be permitted to be operated by any person in this period, it appearing that the licensee (1) after changing his location engaged in operation without first notifying the FCC of his intended operation under port regulations, violation of Sec. 12.91, (2) on Nov. 8, '54 attempted unauthorized communication with Mexican station XFIV, a violation of Sec. 12.101, (3) on Nov. 13, '54 retransmitted signals from KIE 367 over amateur frequencies, a violation of Sec. 12.103, (4) on Nov. 5 and Nov. 9, '54 used A3 on 3750 and 3780 kc. in violation of Sec. 12.111, (5) in the period Oct. 30-Dec. 29, '54, failed to maintain a proper station log, violation of Sec. 12.136, and (6) in Nov. '54 failed to identify his station while testing and otherwise operated said station to produce radiation in violation of Sec. 12.159.

FCC ordered (14 Oct., '55) that the Novice Class amateur operator license of W. D. S. Sharrett, Portsmouth, Va., be suspended for the remainder of the license term (expiration Nov. 22, '55) it appearing that the licensee in July-Aug. '55, engaged in mobile operation of KN4AZY in the 7-Mc. band, A-1, aboard a U. S. Navy vessel beyond the continental limits of the U. S. and in the jurisdiction of a foreign country without approval of the foreign administration, in a frequency band not allocated for mobile outside the continental limits and without first filing a notice of intended mobile operation with the FCC's Engineer-in-Charge of his home district, violations of Sec. 12.91(b)(1)(2)(3); also, that while engaged in such mobile 7-Mc. operation he failed to follow radio station identification procedure, required by Sec. 12.82(e)(1)(i). Also that his emissions from said radio station were not crystal controlled as required by Sec. 12.23(e)(2) and it further appearing that said licensee on specified dates engaged in such operation without the approval of the master of the vessel, and using apparatus not separated from and independent of other shipboard equipment contrary to Sec. 12.94, FCC rules. Under suspension KN4AZY may not be operated by anyone, license to be turned in to FCC.

Checking Harmonics at Output Important. One of the simplest ways to invite FCC citation is to assume that any new rig with a pi-network is absolutely foolproof on the score of harmonic radiation. W0PME, ARRL Official Observer, reports that 7.6-8 Mc. range *much more* filled with harmonic emissions than ever in the past. Here's what he says, "These Saturdays and Sundays one can record a call, fill the card out, pick up another harmonic, fill out the address on the first card, get the new station sign, and repeat this procedure all day long . . . most stations seem to be new ones, perhaps newer hams on

phone before acquiring enough technical background. We tag and send ARRL-cooperative notices to as many as possible . . . and hope to get to them before the FCC."

Readers may review (p. 114, Dec. *QST*) some additional OO comments and suggestions bearing on this problem with respect to this and other bands. It's mighty important, not only to avoid FCC citations, but to keep channels properly assigned and used for life and death purposes, such as air-ground and police frequencies, free from interference!

—F. E. H.

DX CENTURY CLUB AWARDS

HONOR ROLL

W1FH	262	W8SYG	251	W8SN	249
W6VFR	258	W3GHD	251	W6MEK	248
W6AM	256	W3JTC	251	W7AMX	248
W7FDP	254	W3KCO	250	W7KDC	248
W3BES	252	W8NDR	250	W8BRA	248
W6MLX	252	2G2PL	250	W2BXA	247
W8HGW	251	W2AGW	250	W3KT	247
W6ENW	251	W3JNN	251	W5ASG	247

Radiotelephone

PY2CK	247	W9RDI	229	XE1AC	215
W1FH	236	W1MCW	220	W8HGW	214
VG4ERR	233	W1JCX	219	W5BGP	214
ZS6BW	229	W1NWO	217	W9NDA	213
		W3JNN	217		

From November 15, to December 15, 1955 DXCC certificates and endorsements based on postcard contacts with 100-or-more countries have been issued by the ARRL Communications Department to the amateurs listed below.

NEW MEMBERS

YU3BC	120	G3IEW	104	CT1PJ	100
W1VXQ	119	W1VXQ	102	FT1P	100
O29DX	116	ZS5AM	102	G6AX	100
VT2RA	114	W8SMC	101	GM3EFS	100
PY1FT	109	G3EEB	101	OE3SE	100
FF8AJ	108	ZS5AW	101	G3SKV	100
G3FJU	108			VS1FK	100

Radiotelephone

DL4EA	117	DL4BY	104	W9MCX	100
11CJX	106			PY1FT	100

ENDORSEMENTS

W1CLX	241	W1BLO	164	HB9KBC	133
W9RBI	241	W4EPA	164	W9UAC	132
W1TW	241	E15F	162	W2FBS	130
W7FDP	240	W6BIP	160	W1WDC	130
ZL1HY	240	W4QCW	160	F5VK	130
W2QH	230	W0ANE	160	DL4EA	129
W6MUR	224	W6CAE	157	W1NHF	123
W8JBI	220	W8ERK	152	W1RBE	123
GM3DHD	220	W2IRV	150	W9WTC	122
W1VXQ	123	W1VXQ	150	W1PVD	122
W1AXA	210	W6BIL	150	K2GMO	120
W6TZD	209	W9EU	150	W4FID	120
SM5WI	194	G5LP	150	W7FB	120
W5CEW	192	I1AOE	150	WSDLZ	120
O29DX	184	YV5BZ	150	W9WPA	120
W6W6O	180	W9WZ	150	W9WPA	119
W5BNO	180	W9UXO	142	ZE3JO	114
B99MQ	172	W4HYW	140	JA1CR	112
W9ABW	170	W9ALI	140	W1LHZ	110
CT1JS	170	W9KXK	140	W8ZCR	110
OE3EW	170	P4B	140	DLSZ	110
SM5WJ	170	W1EGG	139	DU7SV	110
W0HXA	150	W1FTJ	134		

Radiotelephone

W6MBD	180	W8JBI	145	K2CJN	123
W8HKP	170	SM5WJ	140	W4FPS	121
IIA5M	161	W5CIV	135	W1WDC	120
W1VXQ	160	W9AFV	135	IA0E	120
W8VWD	160	W9WHM	130	W9LTR	110
W0HXA	150	W6T2DZ	126	V82DQ	110
		LUSBS	124		

W/VE/VO Call Area and Continental Leaders	
W4BPD	241
W9NDA	246
VE1HG	150
VE2ZWW	189
VE3QD	210
W2APU	202
W2BXA	202
W4HA	191
W6AM	212
W7HIA	185
VE4XO	118
VE5QZ	140
VE6GD	108
VE7HC	209
VE8AW	145
VE9EP	190
ZS6BW	236
W1LHZ	200
W2FBS	121
W4FID	218
W1WDC	120
W9WPA	120
W9WPA	119
W1PVD	122
W9WPA	119
W1LHZ	110
W8ZCR	110
DLSZ	110
W9LTR	110
V82DQ	110
W4FPS	121
W1VXQ	122
W9WPA	120
W1PVD	122
W9WPA	119
W1LHZ	110
W8ZCR	110
DLSZ	110
W9LTR	110
V82DQ	110
W1WDC	120
W9WPA	120
W1PVD	122
W9WPA	119
W1LHZ	110
W8ZCR	110
DLSZ	110
W9LTR	110
V82DQ	110
K2CJN	123
W4FID	120
W1WDC	120
W9WPA	120
W1PVD	122
W9WPA	119
W1LHZ	110
W8ZCR	110
DLSZ	110
W9LTR	110
V82DQ	110
W4FPS	121
W1VXQ	122
W9WPA	120
W1PVD	122
W9WPA	119
W1LHZ	110
W8ZCR	110
DLSZ	110
W9LTR	110
V82DQ	110
K2CJN	123
W4FID	120
W1WDC	120
W9WPA	120
W1PVD	122
W9WPA	119
W1LHZ	110
W8ZCR	110
DLSZ	110
W9LTR	110
V82DQ	110
W4FPS	121
W1VXQ	122
W9WPA	120
W1PVD	122
W9WPA	119
W1LHZ	110
W8ZCR	110
DLSZ	110
W9LTR	110
V82DQ	110
K2CJN	123
W4FID	120
W1WDC	120
W9WPA	120
W1PVD	122
W9WPA	119
W1LHZ	110
W8ZCR	110
DLSZ	110
W9LTR	110
V82DQ	110
K2CJN	123
W4FID	120
W1WDC	120
W9WPA	120
W1PVD	122
W9WPA	119
W1LHZ	110
W8ZCR	110
DLSZ	110
W9LTR	110
V82DQ	110
K2CJN	123
W4FID	120
W1WDC	120
W9WPA	120
W1PVD	122
W9WPA	119
W1LHZ	110
W8ZCR	110
DLSZ	110
W9LTR	110
V82DQ	110
K2CJN	123
W4FID	120
W1WDC	120
W9WPA	120
W1PVD	122
W9WPA	119
W1LHZ	110
W8ZCR	110
DLSZ	110
W9LTR	110
V82DQ	110
K2CJN	123
W4FID	120
W1WDC	120
W9WPA	120
W1PVD	122
W9WPA	119
W1LHZ	110
W8ZCR	110
DLSZ	110
W9LTR	110
V82DQ	110
K2CJN	123
W4FID	120
W1WDC	120
W9WPA	120
W1PVD	122
W9WPA	119
W1LHZ	110
W8ZCR	110
DLSZ	110
W9LTR	110
V82DQ	110
K2CJN	123
W4FID	120
W1WDC	120
W9WPA	120
W1PVD	122
W9WPA	119
W1LHZ	110
W8ZCR	110
DLSZ	110
W9LTR	110
V82DQ	110
K2CJN	123
W4FID	120
W1WDC	120
W9WPA	120
W1PVD	122
W9WPA	119
W1LHZ	110
W8ZCR	110
DLSZ	110
W9LTR	110
V82DQ	110
K2CJN	123
W4FID	120
W1WDC	120
W9WPA	120
W1PVD	122
W9WPA	119
W1LHZ	110
W8ZCR	

HIGH CLAIMED SCORES — 1955 SWEEPSTAKES

The 1955 Sweepstakes was a real wing-ding! Star brass-pounders W7KVU and W9IOP wound up in a photo finish for national honors as K2AAA outmaneuvered the microphone crowd by a wide margin. Previous records were shattered in every category of competition with new contact and scoring highs reported on both modes. The more than 2000 entries will make this 22nd SS far overshadow its predecessors in participation. At least two Novices have set new QSO and score marks in the KN/WN department.

The figures after each call below indicate claimed score, number of contacts and number of ARRL sections worked. As soon as the checking work has been completed, the official results will appear in *QST*.

C. W.

W7KVU	232,505-1277-73	W2GND	119,446-673-73
W9IOP	232,505-1283-73	W8IFX	119,093-711-67
W4KFC	209,054-1150-73	W2PRN	118,808-651-73
W3DGM	202,298-1044-73	K6CJC	117,863-666-73
W9JLW	191,446-1024-72	W2LN	117,722-656-72
W5DWT	178,831-1014-71	W4BJQ	116,437-675-69
W9ERU	177,943-1003-71	W2QB	116,351-676-69
W3EIS	173,708-1007-69	W9PNE	116,200-669-70
W9RQM	172,440-958-72	K5CAW	116,190-650-70
W7VZP	169,820-958-72	W2IAY	115,940-756-71
W9YFV	162,972-898-73	W7AY	115,850-656-66
W9OCB	162,360-919-73	W8AMU	113,838-652-66
W0YCR	158,580-892-72	W7RAN	113,820-813-70
W3AEL	156,250-875-72	W7NLI	113,575-649-70
W3JNQ	153,352-889-69	W1YMA	112,890-802-71
W8VJL	153,348-866-70	W2DLR	112,772-656-70
W9PHR	150,850-862-70	W3PQ	112,180-633-70
WSPBU	150,520-848-71	W9KLD	111,737-642-70
W9APY	149,575-898-67	W7TKR	111,095-659-68
W5MCT	143,445-800-73	W1ARR	110,950-634-73
W4PNK	142,806-783-73	W4LVV	110,380-675-66
W3AEB	142,700-831-73	W2ZKZ	110,280-675-66
W7VMD	141,036-811-73	W4BIE	108,285-676-64
W4CC	140,800-800-70	W9WBL	107,476-606-71
W2SSC	139,680-776-72	W8NDU	107,450-614-70
W8OYI	135,800-776-70	W4WQK	107,355-641-68
W3GRF	135,012-772-70	W4JUQ	106,762-680-65
W3JZP	134,500-772-70	W7VZP	106,637-675-65
W3GJM	133,622-941-71	W9WJV	105,941-582-73
W9KZJ	133,303-760-71	W1BIIH	105,840-594-72
W3JTC	133,043-729-73	W7GWD	105,788-606-70
W0TKX	132,860-910-73	W9PZT	105,315-620-68
W1BPC	132,475-755-70	W1IAW	105,280-755-68
W3JIC	132,375-755-70	W8VW	105,000-755-68
W9VUL	131,600-752-70	W4JAT	104,401-668-67
W6NWJ	131,583-730-73	W7PQE	103,968-728-72
W8VTF	131,527-741-71	W3DVO	103,850-620-67
K6BLL	131,400-723-73	W1RND	102,637-598-69
W9N1A	129,762-723-70	W9YZA	102,637-590-70
W5JIA	129,762-723-70	W7VZP	102,637-590-70
W8BQJ	127,970-764-67	W3MFJ	101,850-582-67
W3VOS	127,090-711-71	W9PZT	101,660-602-68
W1TYQ	125,063-726-69	W8ETU	101,505-606-67
W2EIV	124,428-699-73	W9IUB	101,376-637-64
W1LJH	124,386-691-72	W7VWU	101,913-629-69
W3CDE	124,290-691-72	W8ZJ	100,900-675-69
W0RYJ	122,710-883-70	W3DPR	100,375-650-73
W8UZJ	122,442-731-67	W3ISE	100,350-669-60
W0CXN	121,500-755-72	K2CPR	100,333-599-60
W6TFT	120,158-823-73	W1ZDP	100,300-593-68

PHONE

K2AAA	188,559-861-73	W5KC	65,340-330-68
W8AJW	115,446-54-71	K6BWD	65,130-335-68
W6NJU	106,820-504-71	W1JEL	64,575-310-70
W7EKS	103,632-512-68	W7ZZA	62,928-442-73
W5LPG	101,616-469-73	W3YRK	62,210-311-67
K6EVR	97,020-492-66	W9OMM	62,207-302-69
W5ZPZ	95,148-472-67	W3V	62,190-302-69
W0PZB	95,148-472-67	W4BAN	60,180-295-68
W7UZR	93,660-449-70	W9BCF	59,112-419-72
W0NPR	91,494-448-68	W5KNA	59,004-302-66
W3VKD	89,352-612-73	W7VKI	58,825-321-61
W8DUS	89,352-612-72	W4PJC	58,449-273-71
W6GQZ	87,435-611-70	W7VIA	57,900-273-70
W1VWU	87,360-416-70	W4FGH	55,476-414-67
W0MPH	79,488-368-72	W8MMY	55,377-294-63
W1FZ	77,622-384-68	W8EIB	55,120-425-65
W4ODR	77,517-397-66	W4CQB	54,925-427-65
K0L	77,420-392-65	W7TJP	54,622-461-61
W8KZB	72,633-394-69	W4GU	54,545-273-69
W3DHM	71,208-344-69	W2ICE	54,400-400-68
W5DQK	69,300-355-66	W1GKJ	52,731-285-62
K3WB	68,352-357-64	W1TRX	52,338-399-66
W6VZZ	68,103-504-69	W1ZKE	51,972-285-61
W6CBE	67,184-494-68	W1ZKE	51,972-285-61
W9LXA	65,520-337-65	W4YTO	51,675-272-65

¹ W6CUF, opr. ² Multioperator station. ³ W7VMQ, opr. ⁴ W1WPR, opr. ⁵ W3WPY, opr. ⁶ K4ARU, opr. ⁷ W1SDO, opr.

W1AW OPERATING NOTE

Complete schedules of current W1AW operation appeared on page 61 of November, 1955 and page 75 of January, 1956 *QST*. See those issues for full information on when and where to look for the ARRL Headquarters station.

LATEST SWEEP-STEAKS NOOS

Them fellers up in Vermont must uv bin out tappin' the maple syrup 'stid uv tappin' their keys this year. Heerd wun uv em once, then he plumb disappeared under a pile-up uv them Kilowatt Karakters snowin' him with calls. Why in tarnation is it you can't find a Vermont stashun fer beans and yet you kin nail 40-eleven guys in them other littul places like Road Eyeland, Merryland, Dellawear and the District of Colombia? Gits under yore hide the last danged hours of the contest.

As fer them chaps Down East to Nova Skosha, someone otta tie up a bundle of *QST*'s and heave em aboard the fust schooner sailin' that way. When you ask them VE1s for an SS number they think yore a-talkin' about a Shortstop on a ball team.

I see they finally done it — them K2s have run the W2s right off in the air. Been so long since I worked a W2 that I wouldn't know what to say to the feller.

And if a guy had took a nice long nap like Rip Van Winkle and just fired up his spark gap again, now wouldn't he think all the old timers in WI-land were back on? Don't work nauthin' nowaday from Noo England but W1A-B-C-D-E-F and you can't hardly tell whether he's a new feller or been on 35 years. Less'n he tells you he's gotta QRT and get his home work done for the 7th grade 'fore his Maw tans his hide. Speakin' of young-uns, I thot them Novices wud be frantic fer workin' anyone who skedaddled up to within 100 kc. of their bands, fixin' to pile up the best Novice score in the section. Wonder where they wuz? Must uv all been out to the Junior Prom or the roller skatin' rink. Only snagged onto three uv 'em and wun wuz a persistent cuin in the next town who wuz gunnin' fer me fer two days.

Ain't seen nuthin' since the Gold Rush like the way the boys fied from ole 80 meters the minit the sun come up Sunday mornin'. Wuz like a skunk had waddled into the croquet game. Left naft but two or three of us hollarin' our fool heads off into a big bunch of empty air. Come time the Sears Roebuck catalog gits here on the RFD, we're goin' to thumb through the pages. Then mebbe we'll no if they hev any of them new-fangled radio machines that goes up on them Ultra-High bands like 40 meters and see why it is that them fellers slither up there so darn fast come daylight.

Nuther thing that gits me to scratchin' my head is the lads you work in the first hour that hand you them numbers like 34 or 46. All I kin see is them boys must uv shot onto the air like a bull that's just busted its chain. And they must be fast-talkin' city fellers who use that-thera Brake-In. Down our way we like to at least take a neighborly minit or two to ask a feller how his crop is comin' along and tell him yore name is Jed or Si 'fore you shut him off too abrupt-like.

Heerd uv wun case uv SS Shell-Shock. Lad over to Squash End (that's just down the road a piece from here) is still tryin' to give a number to every wun he works and he gits mad as all git-out when they don't give him wun right back. Last time I heern him he wuz givin' a W7 number 304,675 and chortlin' like a nanny goat because he only needed two more sections. Poor feller's cows don't get milked half the time neither and the weeds is startin' to QRM his vegetable patch.

Feller up to the Four Corners (that's just up the road a piece from here) went Sweep-Steakin' on phone this year cus he went show-off and got wun uv them store-bought transmitters. Swore off real quick tho and set he'll be back poundin' brass next year. Got so mixed up with them traffic nets that half the time he was takin' the word count on a message to some soldier-boy over to Puerto Rico and that he wuz gittin' an SS number. He wuz gittin' sum TVI too over to that pretty littul ranch house some city folks just built on his Back Forty.

Wal, got to git to gittin' down to write up the Grange Fair now. Hear tell there's some darn pretty heifers down there this year . . . waitin' on the customers at the cider and doughnut table, that is! We'll be SSeein' uv you come next November.

— Jim Robbins, W1VJE, Framingham, Mass.

NATIONAL RTTY CALLING AND WORKING FREQUENCIES

3620 kc. 7140 kc.

FLOOD ENCORE

Last summer we had drought, an almost-unprecedented dry period. In the fall, starting in August, we had floods the like of which we have never seen. Next summer we'll undoubtedly have drought again. Ho hum!

In October, around Columbus Day, it started to rain in the northeast, and rained for five days. The still-water-soaked soil refused to cooperate, and streams again rose. In some places the result was worse than the situation in August; in most places, it was not nearly so bad. We have several reports on October floods which we summarize hereafter.

The Connecticut Net was active on 3640 in view of extensive flooding throughout the state. The worst seemed to be in Danbury, where EC WIADW reported flooding worse than in August. WIDAV NCSed CN much of the time and was instrumental in getting WITIB on the air after WIADW had originated a request for help via WIYNC. During the early part of the flood, Danbury mobiles were used to check water heights. The first inkling of trouble came via WIRTH, Danbury, C.D. Radio Officer, who ran into high water in his mobile. WIVWA, the c.d. station located in the basement of the War Memorial building, was activated; during Sunday, when power failed, WIVWA operated on its 5-kw. emergency generator. On Monday (17th) WIADW/m and WIZKQ/in went to Georgetown, where they were instrumental in handling traffic for the Red Cross. WIUED, en route home to Hartford, was stranded in Danbury and volunteered his services; he was put right to work at WIVWA. WIADW at one time found no power at the Federal Correctional Institution in Danbury, and no telephone lines operating to notify the power company. He reported to WIVWA from his mobile, who relayed the information to WIRTH/m who gave it to a power company crew who relayed it to the company on their own v.h.f. radio. Meanwhile, WIADW had patrolled the lines and discovered the popped cutout. This info was passed over the same route and power was quickly restored. Other amateurs listed as having been active in the Danbury area: WIRDL/m, WIS ACR BEW DDJ EBW, WNS FBD FEH GHK. Some difficulty was experienced on ten meters due to long skip.

The Putnam County (N. Y.) net, just across the line from Danbury and Connecticut's Fairfield County, started operation on Saturday (Oct. 15th) on 3890 kc. Contact was also maintained with Dutchess County to the north and Westchester County to the south on 2 meters. A 2-meter link was in operation between NCS W2HIQ and the Carmel C.D. Control headquarters and police headquarters. Traffic on 75 meters was expedited to Carmel C.D. Control Headquarters via 2-meter link and landline to c.d. headquarters in Danbury. W2HIQ was flooded, but not seriously enough to cease operation. W2RGP relieved the NCS on 75 meters at regular intervals. K2DBE, Putnam County Radio Officer, operated the two-meter link between Brewster and Carmel. SEC W2RTE checked in on 75 meters with the Putnam County NCS. Mobiles checked on local road conditions and relayed this information via two-meter link to c.d. and police authorities at Carmel. Dutchess County control was operated by EC W2HZZ,

and Westchester County control by EC W2QGH.

Brewster EC W2HIQ reports that the overall operation between the three counties was a combined AREC and C.D. (RACES) function, and went off very smoothly. He particularly commends W2s FCA and RGP, and K2DBE for their aid to the control station. W2CRD, affiliated with the Red Cross in Syracuse, relayed much traffic via the Putnam County net to W2GTE, a similarly-affiliated amateur station in New York. Operation was discontinued late Sunday night with a message from the Putnam County C.D. Director thanking all amateurs for their valued assistance. Active but not mentioned above were the following: W2s PQZ FYB ATO AAR ZIS JGV BSR GDD DIR BXW KLD SUG LWI HAC; K2s DFR AYQ EBW EQE/1 CVZ BIF HXG JMY BRK JSK JEQ IWT EYZ K2s EGY EHI CON IEO, W1s YK ZVN BYF WHL, W3FVY.

Schoharie County EC and RO W2NAI reports that "placid little Schoharie Creek became a raging bully after three days of rain, flooding 3200 acres of valley." Mobiles were used almost exclusively until it appeared there would be no power failure, with additional mobiles coming in from Schenectady and Albany. Operation was on 75 and two meters, the latter mostly by RACES units. Local operators were on duty from 2330 October 15 to 2000 October 17, when the Albany contingent took over. In addition, some ten meter mobiles were standing by to help. Operation on 75 meters was performed mostly by the Second Regional Phone Net and the Interstate Phone Net with continuous operation during daylight hours on October 16 and 17. W2NAI reports the following as having been active: W1s BYS DHE EG RMS UKO ULY VAY VDI KIUSA; W2s APF AAO AOW BLN BKR BNC CYW COB CYD DXY DEL DMK DXI EOM EEO EFU FFU FVP GBN GBX GDD HEC ISE JGV JNM JVS KQW KFV KQL KZY LST NIV NOC OOF OPD VNJ WNO YLW; K2s AYQ BRV BDJ BQI BSD CKG CVZ DRZ DGD DJN DXB DYB EST EXB FCC GNZ GOE HQI HON IYP IJK IWO KWF KXZ LYE MEU OTQ PPB; W3s BFF BNR OGQ WUE; W8AVT/2.

With rapidly rising waters along the Delaware River, W2ZI alerted the N. J. Emergency Phone Net on 3900 kc. at 0845 Sunday, October 16 and started lining up stations along the river. By 1530, when state c.d. officials decided to activate RACES networks, things were so well organized that it was decided to carry on on 3900 kc. This resulted in excellent cooperation between ARRL/AREC and RACES networks all along the river. By 1930, mobiles were at all river bridges from Stockton to Phillipsburg reporting the rate of rise, which was given to c.d. officials in West Trenton. Other stations were reporting from Milford, and along the Lehigh River Valley. W2SUG did particularly commendable work in lining up mobiles in Hunterdon County, and other mobiles were sent, through official c.d. request, from as far away as Somerville and Morristown. Over 50 stations reported into the Jersey Emergency Phone Net during the 14 hours of continuous operation.

The Jersey Net also handled an emergency which developed in the Pompton Lakes region and Bergen County when the Ramapo River and Wanaque Reservoir went on a rampage.



With the AREC

We presume that all of you are interested in having your activities reported in *QST*, whether it be in this column, your SCM's report, or elsewhere. If not, there is no problem — just don't report it. Assuming that you *do* want your activities written up, especially those along emergency, AREC or RACES (civil defense) lines, let's have a brief discussion on the best way of accomplishing this, to make it easier and quicker for all concerned.

First of all, we have what you might call a "horse back" policy for material in this column. That is, it's not official and we just *might* deviate, but usually we follow it. Reports of activities in real communications emergencies get first call on the space. After that come other public service activities, and then reports of tests and drills or other special activities. Of course, if you submit usable pictures with your material, that ups the priority considerably, regardless of the subject. Reports of actual emergency operation we consider "musts" in the first available issue of *QST*.

We want all emergencies reported. The best way to do this is to designate one of the group who took part to write it up and send it in. He should be sure to give the date it happened, what kind of an emergency situation was involved, and the calls of all known amateurs who took part. Sometimes it's very difficult to define participation. Is reporting into an emergency net during an emergency participating, even if no traffic is handled? Has a station who stood by ready to assist, but never actually did so, participated? Usually, we list all the calls contained in the report, and thereby let the reporter be the judge as to whether or not the station merits mention.

Very often, after an item appears in *QST* (or after one doesn't that should have), we get letters from irate participants who weren't mentioned, or from amateurs who claim they sent in a complete account to their SEC, their SCM or direct to headquarters many months ago. Well, first of all, don't forget that *QST* isn't a newspaper; we have a six week production lag. For example, this copy for February *QST* is being written on December 14, and must be turned in to the Managing Editor by the 15th. Secondly (let's face it), SECs and SCMs don't always forward such stuff promptly, sometimes (say it isn't so!) not at all. So the safest thing to do (you should know whether your section officials can be trusted to *QSP*) is send it direct to headquarters if it's for "With the AREC" or other than for the SCM's activity column.

Third, although we're not perfect and will cheerfully admit it (might as well), we'd hate to think that all the items which were "sent long ago" have been misplaced at headquarters as charged or insinuated. We're not *that* bad. Often, we suspect, they were never really sent at all. Sometimes they get misrouted here at headquarters because they contain items and material for other departments; in these cases, we usually get them all right, but we get them late. Once in a while they actually do get lost in the mail, but not often. Address your stuff to the Communications Department, Attention National Emergency Co-ordinator, if it's for this column. If you include material or information for other departments, make sure it's on separate sheets with your name and address, so it can be routed separately.

Now you don't have to be a literary genius to write down some details of an operation. If you are, that's fine; but most of us are no great shakes with the pen and can only write down who did what and when. *That's all we want to know!* The chances of your copy getting into the column unscathed are mighty slim in any event; so keep it brief, double space it if typed, and be sure all the essential facts are included. If you help us out in these small ways, you'll be helping yourself out in the end.

During the Bennington Disaster of May, 1954, W1TEN/m was operating at the scene and informed the Second Regional Phone Net and the Interstate Phone Net that telephone services were bogged down and that boys on the ship were anxious to let the folks at home know they were okay. The Red Cross collected the traffic and brought

it to W1TEN/m, who sent it into the net. Later, W1KNE/1, operating from the hospital at Quonset Point, checked in with the same request. The following day W1ULG/1 at the hospital in Newport reported in with traffic, and operation continued until the load lessened. Over 160 pieces of traffic were handled.

During the months of July, August, and September, the Albuquerque, N. M., chapter of the Caravan Club of New Mexico was kept on a permanent ready status for flash floods. The Albuquerque V.H.F. Club was also alerted to help with a 2-meter net. The Caravan Club was actually called out to help with communications nine times. Use of mobiles for headquarters and patrols was the factor that enabled us to set up immediate communications. A total on-the-air time of approximately 72 hours was used in periods of from 2 to 12 hours. Our services were provided for use by the sheriff's office, city police, city and county manager's office. The following are known to have participated, with apologies to any omitted: W1WAL, W4ZOI, W9TLM, K5ADS, K6CQX. W6s ADX CZT ECN FAG FHP FIA FJE FVY GGJ GPE GWI GWJ LEF NSN OAI OIA PDV PIZ RLT UAF UCW UCX UOZ UWA WBG WRS YDE YIK ZMN ZSL — W8UWA, EC Bernalillo Co., N. M.

In the August floods, the Red Cross of Woonsocket, R. I., called on the Blackstone Valley Amateur Radio Club to assist them with their communications problem. Club station W1DDD was activated on ten meters, a mobile was dispatched to Red Cross headquarters and four other



Being EC of an area like Philadelphia County, Pa., is no snap job, but W3DYL does it most capably, tied in strongly with the c.d. organization of the county. Here's the OM himself at his basement operating position.

mobiles were sent to relief centers. The next day relief was provided by mobiles from the Cranston Radio Assn. and amateurs in the surrounding area. One activity deserving special mention is that of W1AUT, who was instrumental in giving the alarm that saved hundreds of lives when the Spindleville Dam burst.

The above should have been included in the flood story which appeared in December *QST*. Thanks to W1ZEZ for calling it to our attention.

Nova Scotia experienced a severe wind and snowstorm on November 19th and 20th which brought amateur radio emphatically into the communications picture. The Cape Breton Emergency Net was activated and operated from 2000 until after midnight handling traffic for telephone, power, telegraph, press, broadcasting companies and many local newspapers. Conditions on 3750 were very poor and many relay stations were necessitated. The net operated for two days in connection with this emergency. SEC VE1RR and EC VE1FH list the following as having been active: VE1s FR PZ XD ZO ST ZB ME ZE ACM ZF FQ AV OC DQ UT AO FH FM SC JA SJ JB NY ACR ARW OM HC DW AAX GA ZM ZD RR. Those in italics received special mention by EC VE1FH.

The Cape Breton Emergency Net was again alerted and put into operation when a ship became grounded in Cape St. Lawrence in a place almost impossible for rescuers to reach. VE1AO got as close as possible with his mobile,

transmitted information on the situation to his fixed station from whence it was handed over to officials concerned. Communications were maintained with the ship by visual signals to VE1AO, then via the Cape Breton Emergency Net to officials concerned, until airplanes and helicopters could be brought into action. The crew was rescued by helicopter the following day. Among the amateurs listed by VE1FH as having participated were VE1s AO PZ FH ZB ZE ME ABW ST SJ JB XD FR HT DS KG ACM FZ OC FQ AV QM FM KK MX UT VU ABZ and VE2ANK.

Iowa SEC W0DDV reports that during a snow, rain and sleet storm on December 3rd, amateurs in Iowa were of assistance when the Iowa State Police radio repeater station was put out of action. They also assisted in restoring power to several farms in outlying areas through cooperation with the Rural Electrification Agency. Stan lists the following stations as having been active during the evening: W0s TED SWX CQL TKN LFJ NXW ZDX HNE SGZ AJA FKB DZC ZLC RAC TVE ZMU GKN CRG BSG OLM MYR VWF ILY/m PKH AZR TLB/m BDR PKT WBK YNF SRQ ZHR DDV; K8s AVO BEC and W0BUH.

On Labor Day, 1955, the El Paso Radio Club provided communications for the annual Pike Peak Hill Climb. Club-member mobile units were stationed at key points along the course to check each racer as it sped past, reporting it to net control. All stations were tuned to the same frequency, so all knew the exact location of each racer at all times. Thus, when a racer was overdue, officials could be notified promptly. Whenever an obstacle or other danger occurred over the course, racers could be signaled down at check points and warned about it. The mobile radio units at the start and finish lines were also able to provide invaluable means of computing the time of each racer. Emergency radio units were also stationed with each ambulance spotted along the course.

The actual race was only the windup of seven days of test runs which preceded it, for which the El Paso club also provided mobile units. The following members participated: W0s CVG MEY TV JMB AWP QQX TKZ VGU HEE HHR VLX KVD YNB YNC RZY KJJ COF, K8s BOJ AGP, KN9CLK, W1VXN/8, W7VKO/8.

The Par-Troy Amateur Radio Assn. of Boonton Township, N. J., conducted an on-the-air survey on October 3rd to determine the practicability of a two-meter c.d. net. Five mobiles and one base station were used. The latter was at the firehouse, and mobiles dispatched to various locations about the township. The mayor and town committeemen rode in mobiles as observers, and the c.d. director was so pleased with the results that he expects to have a two-meter net in operation soon.

October SEC reports were received from sixteen sections: Ala., W. N. Y., Colo., NYC-LI, Minn., Tenn., S. Dak., Ore., Santa Barbara, Mont., Wash., San Joaquin Valley, Ontario, Wis., Nebr., Eastern Pa. Total AREC members represented, 4217. The addition of Eastern Pa. makes thirty sections heard from in 1955.

RACES News

Atlanta RACES Radio Officer W4LXR informs us that the City of Atlanta has now joined the growing list of cities authorized for RACES operation.



The plan is designated "Atlanta, Georgia Metropolitan Area Including the Counties of Fulton, DeKalb, Cobb and Clayton." It provides for a main control and four zone control stations, with mobiles. Operation is on two of the higher-frequency bands with five assigned frequencies, with state tie-in on disaster (non-amateur) frequencies. The plan is in coordination with and in addition to the state-wide RACES plan. Zone control stations have recently had new 16-element beam antennas installed. W4LXR says that they have their problems (as don't we all?) but improvement does continue from day to day.

The Baltimore RACES organization recently sent us a sample of their decals, used on RACES mobiles and other installations for identification purposes. It's very similar to the insignia at the head of this sub-column, except that it

has the words "Baltimore City" around the top of the circle. The letters are white, the background blue, the triangle white with letters "CD" in red and the lightning flash through the triangle with the word "RADIO" in blue inside the flash. We are told that these decals were manufactured by the American Decalomania Company and were purchased through a local dealer at a cost of approximately ten cents each in lots of twelve hundred.

A.R.R.L. ACTIVITIES CALENDAR

Feb. 3rd: CP Qualifying Run — W60WP
 Feb. 4th-19th: Novice Round-up
 Feb. 10th-12th: DX Competition (phone)
 Feb. 14th: Frequency Measuring Test
 Feb. 15th: CP Qualifying Run — W1AW
 Feb. 24th-26th: DX Competition (c.w.)
 Mar. 3rd: CP Qualifying Run — W60WP
 Mar. 9th-11th: DX Competition (phone)
 Mar. 15th: CP Qualifying Run — W1AW
 Mar. 23rd-25th: DX Competition (c.w.)
 Apr. 6th: CP Qualifying Run — W1AWP
 Apr. 13th: CP Qualifying Run — W1AW
 Apr. 14th-15th: CD QSO Party (c.w.)
 Apr. 21st-22nd: CD QSO Party (phone)
 May 5th: CP Qualifying Run — W60WP
 May 14th: CP Qualifying Run — W1AW
 June 1st: CP Qualifying Run — W60WP
 June 9th-10th: V.H.F. QSO Party
 June 12th: CP Qualifying Run — W1AW
 June 23rd-24th: ARRL Field Day

FREQUENCY MEASURING TEST, FEBRUARY 14TH

All amateurs are invited to try their hand at frequency measuring. W1AW will transmit signals for the purpose of frequency measurement starting at 9:30 P.M. EST (6:30 P.M. PST), Tuesday, February 14th. The signals will consist of dashes interspersed with station identification. These will follow a general message sent to help listeners to locate the signals before the measurement transmission starts. The approximate frequencies used will be 3535, 7091 and 14,129 kc. About 4½ minutes will be allowed for measuring each frequency, with long dashes for measurement starting about 9:36 P.M. It is suggested that frequencies be measured in the order listed. Transmissions will be found within 5 or 10 kc. of the suggested frequencies.

At 12:30 A.M. EST, February 15th (9:30 P.M. PST, February 14th), W1AW will transmit second series of signals for the Frequency Measuring Test. Approximate frequencies used will be 3603, 7020 and 14,056 kc.

Individual reports on results will be sent to all amateurs who take part and submit entries. When the average accuracy reported shows an error of less than 71.43 parts per million, or falls between 71.43 and 357.15 parts per million, participants will become eligible for appointment by SCMs as Class I or Class II OOAs respectively.

This ARRL Frequency Measuring Test will be used to aid qualification of ARRL members as Class I and Class II observers. Present observers not demonstrating the requisite average accuracy will be reclassified appropriately until they demonstrate the above-stated minimum required accuracy. Class I and Class II OOAs must participate in at least two FMTs each year to hold appointments. SCMs (see listing, page 6) invite applications for Class III and IV observer posts, good receiving equipment being the main requirement. All observers must make use of the cooperative notices, reporting activity monthly through SCMs to warrant continued holding of appointment.

Any amateur may submit measurements on one or all frequencies listed above. No entry consisting of a single measurement will be eligible for *QST* listing of top results; at least two readings should be submitted to warrant *QST* mention. Listing will be based on over-all average accuracy, as compared with readings made by a professional lab.

NATIONAL CALLING AND EMERGENCY FREQUENCIES (kc)

C.W.: 3550, 7100, 14,050, 21,050, 28,100.
 Phone: 3875, 7250, 14,225, 21,400, 29,640.

CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made on February 15th at 2130 EST. Identical texts will be sent simultaneously by automatic transmitters on 1885, 3555, 7125, 14,100, 21,010, 52,000 and 145,600 kc. The next qualifying run from W6OWP will be transmitted on February 3rd at 2100 PST on 3590 and 7128 kc.

Any person may apply; neither ARRL membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m., you may try later for endorsement stickers.

Code-practice transmissions are made from W1AW nightly at 2130 EST. Approximately 10 minutes' practice is given at each speed. References to texts used on several of the transmissions are given below. These make it possible to check your copy.

Date Subject of Practice Text from December QST
 Feb. 2nd: *The Great Flood of 1955*, p. 11
 Feb. 6th: *Design Notes on a Four-Band Rotary*, p. 19
 Feb. 14th: *6ANS — 6BQ6 Modulator*, p. 26
 Feb. 21st: *A Composite Test Set*, p. 29
 Feb. 23rd: *Designing the VFO*, p. 35
 Feb. 27th: *How to Tune In A.M. Phone*, p. 41
 Feb. 29th: *1955 Field Day — Official Results*, p. 56

TRAFFIC TOPICS

A lot of things that are perfectly natural are not necessarily good. This is a truism that we don't have to accredit to anyone, and that's why we don't put it in quotes. We just made it up ourselves, just now. We were thinking about it in connection with traffic work.

It is perfectly natural for special interest groups to want to stick to and work with people of their own special interests. This is an age of specialization. But specialization tends toward narrowness, and narrowness toward limited vision and limited horizons. For example, take the amateur who operates strictly c.w. Nothing wrong at all about that; if he prefers c.w., and doesn't like phone or other modes, it is to be expected that he will operate on c.w. exclusively. It is his attitude that may be wrong. Too often, he is apt to take the viewpoint that anyone who prefers phone to c.w. has something wrong with him; usually, that he doesn't know the code and is too blankety-blank lazy to learn it. And therefore from comes the conclusion that all phone men are lazy, no-good bums who buy their equipment, stick an antenna on it and spend their amateur operating hours filling the phone bands with a lot of inane yakky-yak. The funny part of it is, this strictly-c.w. fellow not only won't be, but doesn't want to be persuaded that he may be wrong about a lot of phone men.

The same goes for the other side of the fence, of course — the phone guy who sees absolutely no sense in fiddling a key when it is so much easier, faster and pleasanter to talk, and looks upon the c.w. hound as a queer kind of social misfit who doesn't belong in his exalted circles.

Through the years, we have developed a kind of segregation and stand-offishness between the two groups that has been thoroughly inimical to our organized traffic facilities. The c.w. groups have set up their traffic facilities and, in recent years, the phone men their own — for the most part, entirely separate. V.H.F. enthusiasts have striven for independence by handling traffic in relays. RTTY addicts have set up long-haul and short-haul facilities without any particular thought to liaison with existing facilities, using other modes. Single side band nets are beginning to crop up, with a banding together of s.s.b. guys to form a nationwide traffic network. Each thinks that his method or mode is best and wants nothing to do with facilities using other modes, considered to be obsolete, cumbersome, too complicated, too elementary, etc., depending on who is doing the considering.

Well, we can't eliminate these general tendencies entirely, but we ought to give more thought to minimizing them. In 1949, your ARRL set up an entirely new traffic system dedicated to organized and systematic traffic handling by any or all modes. The emphasis was and has always been on organization and system. True, most of the nets have been on c.w., but they need not necessarily be. Versatility is

almost a "must" for effective liaison between all groups. Here are some thoughts that you traffic men might like to pore over:

(1) Phone is excellent for local coverage, because of the widespread availability of operators. V.H.F. should be used more for this purpose. Phone operators who can also operate c.w. for liaison purposes are most valuable. S.s.b. can be worked in either for local or medium-haul purposes. Get together with your SCM so that all section facilities will be working together.

(2) C.w. is fine for local coverage if you have enough operators to make it worth while; otherwise, your c.w. facilities are best devoted to medium-distance or long-distance use. If you have both c.w. and phone facilities at section level, don't neglect liaison between them; make maximum usage of those operators who are equally at home in both modes.

(3) An effective transcontinental RTTY circuit would be wonderful, worked in along with the rest of the system, preferably at the Transcontinental Corp. level. If any of you RTTY enthusiasts would like to get in on the act, consult your TCC Director for more dope.

(4) Effective traffic networks do not grow like Topsy and spread like poison ivy. They are organized for a specific purpose along pre-set coverage boundaries. Don't get interested in traffic by starting your own net; take part in existing NTS nets, give them the benefit of your operating time and skill.

(5) Select the mode to suit the need. Almost everybody is prejudiced one way or another, but let's be practical, and let's let our sense of the practical outweigh our prejudices, for once, for the benefit of amateur radio as a public service.

W1YL reports twenty stations participating during November in the Transcontinental Phone Net. First Call Area, with exactly 600 message counts. Second Call Area reported 901 message counts by 15 stations. W7CPI reports that TCPN W9 and W9 districts handled 286 in October and 559 in November.

National Traffic System. Several nets have written to ask, "How can our net become a part of the National Traffic System?" Unfortunately, in most cases, the answer is that it cannot. NTS is a system of nets at three levels (section, regional and area), each one serving a specific purpose and a specific coverage area. It is not set up to take in already-organized nets. Inexperienced operators start in at section level, gradually working into the higher regional and area levels as they accumulate experience and skill — not just skill in code speed, but in efficient net operation, because at regional and area level network "savvy" is the key to clearing the "through" type of traffic that accumulates there with the best combinations of speed and efficiency. All operators are welcome to participate in NTS, at the level commensurate with their net operating skill. But NTS nets are organized to perform a specific purpose whose functions can seldom be met by already-existing non-NTS nets. November reports:

Net	Sessions	Traffic	Rate	Average	Representation (%)
EAN	22	1011	46.0	96.2	
CAN	25	1053	0.83	42.1	93.3
PAN	22	611	0.59	27.8	91.0
1RN	26	312	0.73	13.5	91.8
2RN	26	420	0.77	16.2	97.7
3RN	44	293	0.51	6.7	88.6
RN5	42	573	0.76	13.7	74.1
RN6	52*	328	0.51	6.6	55.0
RN7	50	321	0.46	6.4	
9RN	26	1600	0.46	25.7	98.0
TEN	70	367	0.46	22.9	70.5
TRN	32	78	0.28	2.5	82.3
Sections *	458	3434			
TCC (Eastern)		367			
TCC (Central)		897			
TCC (Pacific)		660			
Summary	895	12666	2RN	12.0	
Record	895	12666	1.47	12.6	100.0
Late reports:					
RN7 (Oct.)	49	332	—	6.7	—

* Reported, out of 60 sessions held.

** Section nets reporting: TLCN (Iowa); AENT, AENP & AENH (Ala.); CN (Conn.); KYN (Ky.); QKS, QKS 88 & QKN (Kans.); GSN (Ga.); NTX (N. Texas); Tenn. CW & Tenn. 160; WVN (W. Va.); MSN (Minn.); Colo. High Noon & Colo. Slow Speed; Iowa 75 Meter Phone; N. Dak. Fone & N. Dak. CW.

W9DO is trying to get "solid" week end operation on CAN, sacrificing a perfect week day record to do so. PAN has moved to 3675 kc. to avoid commercial QRM; NCS

failing to report make records incomplete. Conn. and Maine made perfect attendance on 1RN. In 2RN, NYS and NLI were both 100% in attendance, NYS for the third consecutive month; certificates have been issued to W2s BXP EAS RG RUF and K2LSF. RN5 representation hit 74% this month, the best ever; W4OGG is looking for a replacement net manager. RN6 is still lacking representation from New Mexico, Colo., Utah, Nevada and T. H. The RN7 report was received on time this month, although lacking some NCS reports. Regional net certificates have been awarded to 9RNers W9HZ, W9KJJ and W92YK — and certificates are not easy to get on 9RN. VE1DB is a newcomer to TRN, helping improve the attendance record from the Maritimes.

The Transcontinental Corps continues to show improvement and quite a rapid turnover. We note, since last month, the addition of W3GEG, W4ZEV and W2ZVV to the Eastern Area roster, and the loss of WSFYO. In the Central Area, Director W9SCA reports that W0ZJF is now assisting, and that W0BRD will soon be doing likewise, although W0BDR and W8SCA handle the bulk of the schedules. The most rapid progress is being shown in the Pacific Area, where Director W0KQD is really signing them up. Since last month we note no deletions and the addition of the following: W6YHM, W7DXV, W7FRU, W7PKW/7, W9BEN, W6CYT, W0KHQ, W8GG.

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for November traffic:

Call	Org.	Recd.	Rel.	Del.	Total
W9NZZ	215	895	0	895	2005
W0BDR	46	783	750	8	1587
W0PZO	3	740	717	7	1467
W0DJO	41	657	634	64	1396
W2KEH	10	603	534	19	1266
W2KFK	22	671	520	91	1304
W0CPI	7	645	574	71	1297
W9SCA	18	565	611	3	1287
W3YYC	271	420	390	25	1106
W7TXY	48	427	427	67	1177
W7B8A	27	491	450	38	1006
W4PFC	10	471	458	5	944
W0KQD	64	382	332	2	780
W4UHA	93	386	232	5	718
W7TXY	22	308	256	52	636
W6DDE	3	354	359	429	639
K6HOV	2	308	302	8	620
W90R	17	302	247	43	609
W0ZJF	14	289	280	3	586
K6WAY	146	133	246	27	552
W0ZJF	49	231	216	33	549
W9TTL	3	288	239	9	530
W9GJH	10	259	212	47	528
W2RUF	28	264	194	39	525
W4PDU	4	260	240	20	524
K6FCY	42	235	204	31	512
W7FRU	6	254	234	16	510

More-Than-One-Operator Stations

W61AB	22	1275	1293	72	2572
W6YDK	41	812	715	97	1665
KHGAF	258	589	309	72	1228
K9BEB	107	473	396	47	1023
K1USA	18	398	345	5	577
K4FDY	76	244	227	9	556
KHGQH	147	184	72	113	516
Late Report:					
W6YDK (Oct.)	46	884	831	53	1814

BPL for 100 or more origination-plus deliveries:

W4DDY	192	K2HVT	116	W0FDJ	103
W3CVE	179	W3ELI	115	VE1AO	103
W9Y	167	W9SA	112	W9DDK	102
W7WOK	132	K2Z	101	W0H	100
W6LYG	138	W0RLQ	110	W0WDW	100
W7AHV	136	W4HDR	108	VE1FQ	100
W8NOH	128	W0LJW	108	Late Reports:	
W9DGA	126	W0WGE	107	W4ZEB (Oct.)	217
K4AFB	121	W0FEO	121	W0FEO (Oct.)	123
W6C8Y	119				

More-Than-One-Operator Stations

W1AW 127
K3WB 106

BPL medallions (see Aug. 1954 QST, p. 64) have been awarded to the following amateurs since last month's listing: W6MBW.

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed by members in the following Sections, completing their election in accordance with regular League policy, each term of office starting on the date given.

Alaska Dave A. Fulton, KL7AGU Jan. 15, 1956

In the Colorado Section of the Rocky Mountain Division, Mr. James B. Simpson, W9HEM, and Mr. Reno V. Rosellini, W8SYA, were nominated. Mr. Simpson received 117 votes and Mr. Rosellini received 92 votes. Mr. Simpson's term of office began Nov. 23, 1955.

In the Ohio Section of the Great Lakes Division, Mr. Wilson E. Weckel, W8AL, and Mrs. Marvel Sines, W8HUX, were nominated. Mr. Weckel received 617 votes and Mrs. Sines received 447 votes. Mr. Weckel's term of office began Dec. 14, 1955.

In the Illinois Section of the Central Division, Mr. George T. Schreiber, W9YIX, and Mr. Edmond A. Metzger, W9PRW, were nominated. Mr. Schreiber received 844 votes and Mr. Metzger received 275 votes. Mr. Schreiber's term of office began Dec. 15, 1955.

ELECTION NOTICE

(To all ARRL members residing in the Sections listed below.)

You are hereby notified that an election for Section Communications Manager is about to be held in your respective Section. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned, in good standing, are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been a licensed amateur for at least two years and similarly a full member of the League for at least one continuous year immediately prior to his nomination.

Petitions must be in West Hartford, Conn., on or before noon on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, and station call of the candidate should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, with no time to return invalid petitions for additions, a petition may be found invalid by reason of expiring memberships, individual signers uncertain or ignorant of their membership status, etc.

The following nomination form is suggested: (Signers will please add city and street addresses to facilitate checking membership.)

Communications Manager, ARRL [place and date]
38 La Salle Road, West Hartford, Conn.

We, the undersigned full members of the ARRL Section of the Division, hereby nominate as candidate for Section Communications Manager for this Section for the next two-year term of office.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence the names of all eligible candidates.

You are urged to take the initiative and file nominating petitions immediately. This is your opportunity to put the man of your choice in office.

—F. E. Handy, Communications Manager

Section	Closing Date	SCM	Term Ends
Yukon*	Feb. 15, 1956	W. R. Williamson	Mar. 17, 1949
West Indies	Feb. 15, 1956	William Werner	Aug. 15, 1952
Utah	Feb. 15, 1956	Floyd L. Hinshaw	Feb. 18, 1954
Maritime*	Feb. 15, 1956	Douglas C. Johnson	Feb. 15, 1956
North Carolina	Feb. 15, 1956	Charles H. Brydges	Resigned
Arizona	Feb. 15, 1956	Albert H. Steinbrecher	Apr. 15, 1956
Tennessee	Feb. 15, 1956	Harry C. Simpson	Apr. 15, 1956
Connecticut	Feb. 15, 1956	Milton E. Chaffee	Apr. 15, 1956
Washington	Feb. 15, 1956	V. S. Gish	Apr. 15, 1956
Alberta*	Feb. 15, 1956	Sydney T. Jones	May 1, 1956
Louisiana	Mar. 15, 1956	Thomas J. Morgavi	May 31, 1956
Eastern Mass.	Apr. 16, 1956	Frank L. Baker, Jr.	June 15, 1956
Ontario*	Apr. 15, 1956	G. Eric Farquhar	June 15, 1956
Idaho	Apr. 15, 1956	Alan K. Ross	June 17, 1956
Northern New Jersey	May 15, 1956	Lloyd H. Manamon	July 26, 1956

* In Canadian Sections nominating petitions for Section Managers must be addressed to Canadian Director Alex Reid, 160 Logan Ave., St. Lambert, Quebec. To be valid, petitions must be filed with him on or before closing dates named.

Station Activities

All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, Clarence Snyder, W3PYF — SEC: NNT. RM: AXA. PAM: TEJ. EPA Nets: 3850 at 1800 Mon. through Fri., 3610 kc. at 1830. AXA is the proud papa of a new YL jr. operator born Nov. 17th. He now has a new 813 rig on the air. OSA is off the air because of illness. Twenty-three operators are now taking code instructions at Lancaster ARC. WWG, president of the Mike Farad Traffic Net, has taken employment in W6-Land. The Carele Radio Club has changed its name to the Carbon Amateur Radio Club. ADE has a new Viking Ranger. ZRQ reports that the Tamaqua ARC now has 41 members. GH now has emergency power. BNR has a new Elmac AF67 for mobile. CBZ now has RCC and OTC certificates. YAZ has a new NC-300. ZIV and RUE are both instructors at East Stroudsburg State Teachers College. NNV reports his son AQI is now on duty at Plattsburgh (N.Y.) AFB. FPC is looking for more 10-meter activity in the wee morning hours. GHS was the speaker at the December meeting of the North P. n.d. SCM. VOE reports his traffic handling has been curtailed because of school work. ARK now has CIOO because of his efficiency in the F.M.T. The PFW continues to operate at 1800 hours, week days. Mon. through Fri., under the direction of TEJ. TEJ invites interested amateurs to call in whenever possible. PVY, net manager of the Anthracite Net, invites amateurs interested in traffic-handling to call in on 3610 kc. at 1800 hours. The AN Net is a slow-speed net and newcomers are welcome. Once again I invite secretaries of clubs to write me regularly of news of their club members and club activities. Information should be in my hands by the 3rd of the month. A new amateur radio club has been formed in the Allentown Area called the Lehigh Amateur Radio Club with SCT, pres.; LXM, vice-pres.; OMI, secy.; and BPZ, treas. The NPARC aided the Lansdale Police during the Lansdale Jr. Chamber of Commerce's Christmas Parade and Mardi Gras. TSY has moved to York. WN3EEK is a new ham in the Tamaqua Area. RZV is now a reporter for the *Allentown Morning Call* Traffic. (Nov.) W3CUL 549, OK 228, BFF 204, YDX 200, TEJ 150, ELI 130, DHJ 109, YVX 97, OGD 74, WUE 64, GYI 37, YAZ 37, NOK 35, ZBW 33, DDZ 28, DUI 28, DUL 28, BNR 26, AXA 23, ZRQ 21, GES 18, ZLX 16, PYF 10, ADE 8, ZLB 8, YUO 5, DGM 4, CMI 3, HOF 3, AMC 2, VOE 2 (Oct.) W3BF 55, DUI 19.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, John W. Gore, W3PRL — YBQ recently became a member of the Convalescent Net. After suffering a badly-broken leg he was taken to a Baltimore hospital and arranged to have his 10-meter station set up in his hospital room by his brother. ICA/M was his first contact and it developed that a better antenna was indicated. In no time at all ICA/M arranged for a VFO and a 10-meter whip on the hospital roof with a coax feedline, with the result that Bob was able to scoop up and down the band with a healthy signal which assisted greatly in his recuperative powers. QZVS is a new qualified TCRN representative. K4WBK has been awarded an "active and qualified" TCRN certificate. ZME worked 39 countries in three months with 60 watts, on one 14.020-Mc. crystal. WV reports attendance in MDD picking up and traffic totals increasing. BKE has a new DX-100 transmitter, also a new NC-300 receiver. SPL reports JDP has been appointed secy.-treas. of the Delaware Emergency Net and ZNE is Radio Officer for Kent County. OYX reports that EHA has received his Old Timers Club certificate and that YRK has his new "fiberglass Scottie beam" mounted on a 45-ft. pole and has been working all corners of the earth. OYX also reports three newcomers to the ranks in his area: WN3EDA, N3ENC, N3END. GRP has reported extensive experimentation on 2 meters, both transmitting and receiving, with the objective of getting the last mile out of the last $\frac{1}{4}$ watt and receiverwise to be able to receive the weak signals of distant stations built up to a readable level. AKB and BWT, OM

and XYL, finally are getting into full operation at their new QTH and after everything is smoothed out no doubt will be found more constantly on the bands. They report that the Washington Radio Club at its November meeting were treated to a presentation by the local Chesapeake & Potomac Telephone Co., who put on a demonstration with microphones and tape recorders, on "Voice Technique." The Capital Suburban Radio Club held a mammoth auction on Nov. 2nd. EQK wishes to express his many thanks to the 725 members in the Atlantic Division who had enough confidence in him to vote for him for Vice-Director and stated that he wished more power to the man who won. EQK further reports that he recently worked VP8AQ, ZE3JG, and FB8SC. Art needs only one or two verifications to complete his WAA, CCC, and WWI as well as TPG, certificates, having worked 32 out of 40 zones. Your SCM had an FB trip to the Harford Amateur Radio Assn. meeting in Aberdeen, where the groundwork was laid for the formation of a Harford County TVI Committee. Traffic: (Nov.) W3YYC 1106, WV 365, WZL 305, UE 241, CVE 235, KW3BJ 230, W3UCR 124, RV 58, BUD 55, PQ 43, PKC 8, OYX 6, BKE 4. (Oct.) W3WZL 298, BWT 4.

SOUTHERN NEW JERSEY — SCM, Herbert C. Brooks, K2BG — SEC: ZVW. PAM: ZI. New appointments: RUX as EC for Cumberland County. K2ETG is Aast. EC, YRW, Delaware Valley Net (2-meter) mgr. has a new 55-ft. tower. Net members regularly taking part are K2GWK, K2ITP, K2ITQ, K2KVE, W3GDI and W3WQL. KTR reports working 34 countries in three weeks using vertical and 65 watts on 40 meters. ZI reports the Jersey Phone Net is operating daily on 3900 kc. with 8 to 15 stations taking part. So, Jersey was well represented in the SS Contest by K2CPR, W2HDW, K2HZR, K2ITP, and W2EBW. BAY is prepared for 10-meter DX with a new beam. ZVW is building new equipment for c.d. work. Burling County's new officers are ADA, pres.; and WKI, vice-pres. Regular weekly drills are held by the club members on 2 and 10 meters. The club station is K2KED. The Jersey-Penn is in operation on 29.4 Mc. at 10 A.M. each Sun. New control stations are JRP and QBL. The Moorestown Friends School, F.S., was the origin of 20 messages as a result of a communication demonstration given by the licensed students. Those taking part were K2ITP, K2ITQ, K2PDH, K2MUJ, K2PNV, K2NODO, and K2QKA. DVRA News keeps its membership well informed by printing an Official Bulletin. UAR is now located in Lumberville. ZI was a guest of the Antique Wireless Assn. in Rochester. It is hoped that counted not having an active EC will suggest one of their capable men for appointment. Traffic: W2RG 174, K2HZR 109, W2YRW 79, K2BHQ 64, KJC 36, ITP/2 30, W2ZVW 24, ZI 23, HDW 13, K2CPR 2.

WESTERN NEW YORK — SCM, Edward G. Graf, W2SJV — Asst. SCM: Jeanne Walker, 2BTB. SEC: UTH/FRL. RMS: RUF and ZRC. PAMs: TEP and NAL. NYS C.W. meets on 3615 kc. at 6:30 p.m. ESS on 3590 kc. at 6 p.m.; NYS Phone on 3925 kc. at 6 p.m.; TAR on 3720 kc. at 4 p.m.; NYS C.D. on 3509.5 and 3993 kc. at 9 a.m. Sun.; TCPN 2nd Call Area on 3970 kc. at 7 p.m.; SRPN on 3970 kc. at 10 A.M.; ISN on 3980 kc. at 3 p.m. K2HRB is a new OES. QXV renewed as EC. Club meetings devoted to discussion of incorporation were held by RAWNY, Elmira ARA, RAGS, and KBT. New officers of ARATS are VCI, pres.; OZP, vice-pres.; SEX, secy.-treas. At a recent meeting RPO and VCI gave a demonstration and talk on "Basic Antenna Theory, Feeding and Proper Loading." We welcome the Auburn ARA as an ARRL affiliate. It is with regret that we report the passing to Silent Keys of SLD. K2DQ now is vice-president of research at Eastman Kodak. ZS and his XYL returned from a trip to Europe. ZOL has three 75-ft. poles with $\frac{1}{2}$ -wave 75-meter doublet between the end poles, 20-meter telrex four-element rotary atop one pole, and 2-meter coax ground plane on another. The Rochester v.h.f. group met at the QTH of YIE. RACES authorization was received by K2AQY, Radio Officer for Wyoming Co. Net certificates have been issued to LGE and K2s JGP, IJT, and KWF. FE was elected president of the local Kiwanis Club. QXV is RO of St. Lawrence Co. The KBT held an Auction Nite. New officers of the Oswego Co. RC are UMI, pres.; K2DUR, vice-pres.; FFU, secy.; UNU, treas.; KN20JK is a new ham in Madison Co., with an AT-1 and an S38-C. JNM spoke at a meeting of the Madison Co. Wireless Club on mobile operation. QHH has WAC on 21 Mc. (6-band WAC) with a Ranger; he has worked 235 countries. HXG is RO for Seneca Co. RACES authorization was received for Dunkirk and Chautauqua Counties. New officers of the CARs are GRB, pres.; EJO, vice-pres.; THV, secy.-treas. GHU, TQT, and (Continued on page 80)

The Heterodyne VFO

HTHE HETERODYNE VFO in its simplest form consists of a crystal oscillator, a variable frequency oscillator, and a suitable mixer circuit which will pass the desired sum or difference frequency of the two oscillators. A unit of this type appeared in an article by Bliss and Bailey in *QST* for July, 1940, and more recently the advantages of this method of frequency control were described by F. A. Bartlett in the June, 1952 issue. Construction of an elaborate heterodyne exciter is fully covered in recent issues of the ARRL Handbook, yet because of its seeming complexity and a lack of understanding of its many superiorities the heterodyne VFO has never enjoyed the popularity to which it is entitled.

HTHE NEW HALICRAFTERS HT-30 Transmitter Exciter embodies a heterodyne VFO of unrivaled versatility. In single sideband transmitters the customary methods of frequency multiplication by doublers, etc., cannot be used and any change of frequency from that at which the SSB signal was originally generated must be by the heterodyne method; therefore a heterodyne VFO is a natural for this application. However — that is only part of the story. The CW operator, and particularly the traffic man who demands perfect break-in operation, will find the new HT-30 with its heterodyne VFO the answer to all his problems.

HIN THIS TRANSMITTER keying is accomplished in the mixer and amplifier circuits and because neither the crystal oscillator nor the VFO operates anywhere near an amateur frequency — when the key is up there is no signal, although both oscillators run continuously. Frequency stability is excellent, there is no possibility of chirp due to starting and stopping of an oscillator, and keying characteristics can be shaped as desired without difficulty.

WE ARE STRESSING the CW operation of the new HT-30 on this page because its outstanding performance as a single sideband phone transmitter may obscure some of its other virtues and we don't want our CW traffic handling friends to miss out on such a good thing.

— Cy Read, W9AA

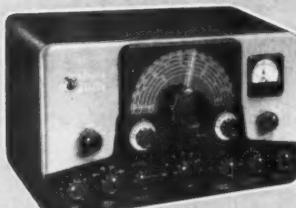
Bisballey Jr. W. J. Healy Jr. W9AC for halicrafters

I BOUGHT THE VIKING "RANGER"...

the best low power transmitter
on the market !



...says
Alex Desmeules
VE2AFC



VIKING "RANGER" TRANSMITTER

75 watts CW input . . . 65 watts phone. All amateur bands from 10 through 160 meters. TVI suppressed—built-in VFO or may be crystal controlled. Timed sequence (break-in) keying system. Available as a kit or completely wired and tested.

Cat. No. **240-161-1** Viking "Ranger" Kit, with tubes, less crystals, key, and mike. \$214.50
240-161-2 Viking "Ranger", wired and tested. 293.00



E. F. JOHNSON COMPANY

2803 SECOND AVENUE SOUTHWEST • WASECA, MINNESOTA



VIKING II TRANSMITTER

180 watts CW input . . . 130 watts phone. Bandswitching on all amateur bands from 10 through 160 meters—effectively TVI suppressed—completely self-contained. Available as a kit or completely wired and tested.

Cat. No. **240-102-1** Viking II Transmitter Kit, with tubes, less crystals, key, and mike. \$279.50
240-102-2 Viking II Transmitter, wired and tested. 337.00

FOR CIVIL DEFENSE . . . 1.7 to 30 mc.; push-to-talk operation; modulation limiting.

240-102-16 Viking II-CDC Transmitter, assembled, wired and tested with tubes, less crystals, key and microphone. \$430.00

VIKING VFO KIT

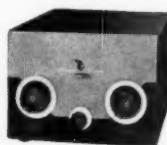
Variable frequency oscillator with 160 and 40 meter output for frequency multiplying transmitters. Accurately calibrated 160 through 10 meters. Available as a kit or wired and tested.

Cat. No. **240-122-1** Viking VFO Kit, with tubes. \$45.50
240-122-2 Viking VFO Kit, wired and tested. 69.75

VIKING 250 Watt "MATCHBOX"

Performs all loading and switching functions required in medium power stations. Fully shielded—covers 3.5 to 30 mc. Built-in transmit/receive relay.

Cat. No. **250-23** Viking 250 Watt "Matchbox", assembled, wired, and tested. Amateur Net \$49.85



2 METER VFO

Exceptionally stable, temperature compensated, and voltage regulated. Designed to replace 8 mc crystals in frequency multiplying transmitters. Only 4" x 4½" x 5".

Cat. No. **240-132-1** Viking 2 Meter VFO Kit with tubes and pre-calibrated dial. \$29.50
240-132-2 Viking 2 Meter VFO wired, calibrated and tested—with tubes. 46.50

SWR BRIDGE

Provides accurate measurement of SWR for effective use of low pass filter and all antenna couplers.

Cat. No. **250-24** \$9.75



TELEGRAPH KEYS

Semi-automatic, high speed standard, heavy duty and practice keys. Code practice sets, cords and wedges for semi-automatic models.

See your distributor

Johnson Amateur Equipment is sold only through Authorized Johnson Distributors—most offer convenient time payment plans. For complete information see your distributor.



VIKING "ADVENTURER" CW KIT

Compact, completely self-contained 50 watt transmitter kit. Single knob bandswitching—effectively TVI suppressed. Easy assembly by novice or experienced amateur. 80, 40, 20, 15, and 11-10 meters. Cat. No. 240-181-1 Viking "Adventurer" Kit complete with tubes, less crystals and key. Amateur Net \$54.95

"SIGNAL SENTRY"

Monitors CW or phone signals without regard to operating frequency. Energized by transmitter RF. Serves as code practice oscillator with simple circuit modification. Cat. No. 250-25 "Signal Sentry", wired and tested, with tubes. Amateur Net \$18.95



100 KC CALIBRATOR

Provides accurate 100 KC check points to 55 mc. High quality, hermetically sealed military type crystal. Requires 6.3 volts at .15 amps. and 150 to 300 volts at 2 ma. With 6BH6 tube. Cat. No. 250-28 100 KC Calibrator wired, with tube, less power supply. Amateur Net \$17.25



VIKING KILOWATT "MATCHBOX"

Bandswitching—completely self-contained. Covers 80 through 10 meter amateur bands. Fully shielded—performs transmission line matching and switching functions at the kilowatt level. Cat. No. 250-30 Kilowatt "Matchbox", assembled wired, and tested. Amateur Net \$124.50



POWER REDUCER

Permits 100-150 watt transmitters such as Johnson Viking, Collins 32V or others, to serve as excitors for Johnson Kilowatt. Shielded—up to 20 watts dissipation. Cat. No. 250-29 Amateur Net \$13.95



LOW PASS RF FILTER

Handles more than 1000 watts RF—provides 75 db or more attenuation about 54 mc. Cat. No. 250-20. \$13.50



E. F. JOHNSON COMPANY

2803 SECOND AVENUE SOUTHWEST • WASECA, MINNESOTA

I BOUGHT THE VIKING KILOWATT...

a Full kilowatt AM, CW, and SSB!



...says
Dr. George C. Wright
WILOS



VIKING KILOWATT POWER AMPLIFIER

1000 watts AM, CW, or SSB. Boldly styled... contains every conceivable feature for safety, operating convenience, and peak performance.

Cat. No. 240-1000 Viking Kilowatt Power Amplifier—wired, tested, complete with tubes. Amateur Net \$1595.00

Cat. No. 251-101-1 Matching Accessory Desk Top and three drawer pedestal. FOB Perry, Pa. \$123.50

See your distributor

Johnson Amateur Equipment is sold only through Authorized Johnson Distributors—most offer convenient time payment plans. For complete information see your distributor.



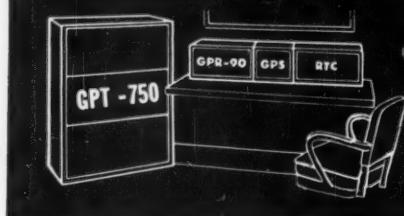
THE TECHNICAL
MATERIEL CORPORA-

TION, and TMC CANADA, LIMITED, have for many years been engaged in the manufacture and sale of high quality precision communications equipment such as, high stability direct reading oscillators, radio teletype frequency shifters and converters, broadband transformers, tone telegraph systems and diversity and fixed tuned receivers. Millions of dollars worth of this equipment is in use in twenty or more countries throughout the world.



YOUR COMPLETE

Here for the first time is a complete package - every item necessary to go on the air A1, A2, A3 except the antenna and that is in the works right now.



GPR-90

RECEIVER

- Six Bands - .54-31 mc., AM, CW, MCW, FS.
- Full Electrical Bandspread and Main Tuning.
- Antenna matching with Ferrite Transformer. 75 ohm unbal. and/or 300 ohm bal. inputs.
- One Microvolt Sensitivity or better for 10-1 Signal to Noise Power Ratio.
- Selectivity in 6 Steps, Variable, 200 cy. to 5 kc. 5 Crystal, one non Crystal.
- Hum Level - Better than 60db down. Image Ratio - Better than 60db.
- Exclusive Audio Selectivity Control.
- SSB coaxial IF output and Audio input.
- Diversity Operation with GPR-D, HFO, BFO, IFO External Controls.
- For Complete Details Request Bulletin F-179B.



EQUIPPED HAM SHACK

GPT-750 TRANSMITTER

- Full KW - Input phone, or A2 or A1.
- Continuous Frequency Coverage 2 to 32 mega-cycles.
- Completely Bandswitched.
- High Stability Direct Reading V.F.O.
- Pi-network Output.
- TVI Suppressed
- Coax Output 30 to 140 ohms.
- All Decks on Slides for Easy Servicing.
- Double Blower Pressurized Cabinet. Fiberglass Filters.
- Interlock Protected - Overload Protected.
- F.S. Available on Request.
- Final Available for SSB Operation.
- For Complete Information Request Bulletin F-174A.

RTC REMOTE CONTROL AMPLIFIER

- Modulation Indicator.
- A1, A2 (tone), A3 Emission Control.
- Peak Clipping Amplifier - Clipper Adjustable 0 to 20db.
- Modulation Control.
- Keying and Monitor Jack.
- Push-to-Talk Mike Input.
- Receiver Muting.
- For Complete Information Request Bulletin F-183



THE TECHNICAL MATERIEL CORPORATION

OTTAWA, ONT., CANADA

MAMARONECK, NEW YORK.



New

Heathkit VFO KIT

MODEL VF-1

\$1950

Ship. Wt. 7 lbs.

Here is the new Heathkit VFO you have been waiting for. The perfect companion to the Heathkit Model AT-1 Transmitter. It has sufficient output to drive any multi-stage transmitter of modern design. A terrific combination of outstanding features at a price. Construction is and electrical design insures operating stability. Coils are wound on heavy duty ceramic forms, using Litz or double cellulose wire coated with polystyrene cement. Variable capacitor is of differential type construction, especially designed for maximum bandspread and features ceramic insulation and double bearings.

This kit is furnished with a carefully precalibrated dial which provides well over two feet of calibrated dial scale. Smooth acting vernier reduction drive insures easy tuning and zero beating. Power requirements 6.3 volts AC at .45 amperes and 250 volts DC at 15 mills. Just plug it into the power receptacle provided on the rear of the AT-1 Transmitter Kit. The VFO coaxial output cable terminates in plastic plug to fit standard $\frac{1}{4}$ " crystal holder. Construction is simple and wiring is easy.

- Smooth acting illuminated and precalibrated dial.
- 6AU6 electron coupled Clapp oscillator and OA2 voltage regulator.
- 10 Volt average output on fundamental frequencies.
- 7 Band calibration, 160 through 10 meters, from 3 basic oscillator frequencies.

Open layout—
easy to build
simplified
wiring.

Smooth acting
illuminated
dial drive.

Clean
appearance
—
construction
accessible
calibration
adjustments.

Ceramic coil
forms
different
condenser.

Copper plated
chassis—careful
shielding.



Heathkit AMATEUR TRANSMITTER KIT

MODEL AT-1

\$2950

Ship. Wt. 16 lbs.

Here is a major Heathkit addition to the Ham radio field, the AT-1 Transmitter Kit, incorporating many desirable design features at the lowest possible dollar-per-watts price. Panel mounted crystal socket, stand-by switch, key click filter, A. C. line filtering, good shielding, etc. VFO or crystal excitation—up to 35 watts input. Built-in power supply provides 425 volts at 100 MA. Amazingly low kit price includes all circuit components, tubes, cabinet, punched chassis, and detailed construction manual.

SPECIFICATIONS:

Range	80, 40, 20, 15, 11, 10 meters.	Oscillator	6AU6
		Mixer	6146
		Amplifier	5U4G
		Rectifier	12A6
	125 - 250 Volts A.C.	50-60 cycles 100	
		watts. Size: $\frac{5}{8}$ inch high x $13\frac{1}{8}$ inch wide x 7 inch deep.	

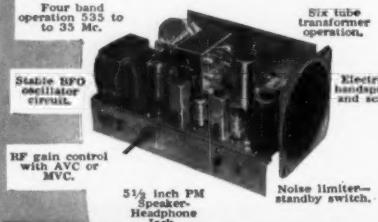
Rugged,
clean
construction.

Single knob
band
switching.

52 ohm
coaxial
output.

Built-in power
supply.

Prewound coils
metered
operation.



Heathkit COMMUNICATIONS RECEIVER KIT

MODEL AR-2

\$2550

Ship. Wt. 12 lbs.

A new Heathkit AR-2 communications receiver. The ideal companion piece for the AT-1 Transmitter. Electrical bandspread scale for tuning and logging convenience. High gain miniature tubes and IF transformer for high sensitivity and good selectivity. Construct your own Communications Receiver at a very substantial saving. Supplied with all tubes, punched and formed sheet metal parts, speaker, circuit components, and detailed step-by-step construction manual.

SPECIFICATIONS:

Range	535 Ke to 35 Mc	Mixer-oscillator	12BE6
		I. F. Amplifier	12BA6
		Detector	AV10
		12BA6	
		H. F. O. oscillator	12A6
		Beam power output	12A6
		Rectifier	12A6
	105 - 125 Volts A.C.	50-60	
		cycles, 45 watts.	

CABINET:

Proxylin impregnated fabric covered plywood cabinet. Shipping weight 5 lbs. Number 91-10, \$4.50.

HEATH COMPANY

BENTON HARBOR 9, MICHIGAN

New HEATHKIT DX-100

PHONE AND CW TRANSMITTER KIT



MODEL DX-100

Shpg. Wt. 120 lbs.

\$189.50

Shipped motor freight unless
otherwise specified. \$50.00
deposit with C.O.D. orders.

- R.F. output 100 watts Phone, 125 watts CW.
- Built-in VFO, modulator, power supplies. Kit includes all components, tubes, cabinet and detailed construction manual.
- Crystal or VFO operation (crystals not included with kit).
- Pi network output, matches 50-600 ohms non-reactive load. Reduces harmonic output.
- Treated for TVI suppression by extensive shielding and filtering.
- Single knob bandswitching, 160 meters through 10 meters.
- Pre-punched chassis, well illustrated construction manual, high quality components used throughout—sturdy mechanical assembly.

Heathkit GRID DIP METER KIT



MODEL GD-1B

\$19.50 Ship. Wt. 4 lbs.

The invaluable instrument for all Hams. Numerous applications such as pretuning, neutralization, locating parasitics, correcting TVI, adjusting antennas, design procedures, etc. Recent applications include measuring C and Q of components—determining RF circuit resonant frequencies.

Covers 80, 40, 20, 10, 6, 2, and 1 1/4 meter Ham bands. Complete frequency coverage from 2—250 Mc. using ready-wound plug-in coils provided with the kit. Accessory coil kit, Part 341-A at \$3.00 extends low frequency range to 350 Kc. Dial correlation curves furnished.

Compact construction, one hand operation, AC transformer operated, variable sensitivity control, thumb wheel drive, and direct reading calibrations. Precalibrated dial with additional blank dials for individual calibration. You'll like the ready convenience and smart appearance of this kit with its baked enamel panel and crackle finish cabinet.

HEATH COMPANY
A SUBSIDIARY OF DAYSTROM, INC.
BENTON HARBOR 9, MICHIGAN

This modern-design Transmitter has its own VFO and plate-modulator built in to provide CW or phone operation from 160 meters through 10 meters. It is TVI suppressed, with all incoming and out-going circuits filtered, plenty of shielding, and strong metal cabinet with interlocking seams. Uses pi network interstage and output coupling. R.F. output 100 watts phone, 125 watts CW. Switch-selection of VFO or 4 crystals (crystals not included).

Incorporates high quality features not expected at this price level. Copper plated chassis—wide-spaced tuning capacitors—excellent quality components throughout—illuminated VFO dial and meter face—remote socket for connection of external switch or control of an external antenna relay. Preformed wiring harnesses—concentric control shafts. Plenty of step-by-step instructions and pictorial diagrams.

All power supplies built-in. Covers 160, 80, 40, 20, 15, 11 and 10 meters with single-knob bandswitching. Panel meter reads Driver Ip, Final Ig, Ip, and Ep, and Modulator Ip. Uses 6AU6 VFO, 12BY7 Xtal osc.-buffer, 5763 driver, and parallel 6146 final. 12AX7 speech amp., 12BY7 driver, push-pull 1625 modulators. Power supplies use 5V4 low voltage rect., 6A15 bias rect., 0A2 VFO voltage reg., (2) 5R4GY hi voltage rect., and 6AQ5 clamp tube. R.F. output to coax. connector. Overall dimensions 20 1/2" W x 13 1/4" H x 16" D.

Heathkit ANTENNA COUPLER KIT



MODEL AC-1

\$14.50 Shpg. Wt. 4 lbs.

Poor matching allows valuable communications energy to be lost. The Model AC-1 will properly match your low power transmitter to an end-fed long wire antenna. Also attenuates signals above 36 Mc, reducing TVI. 52 ohm coax. input—power up to 75 watts—10 through 80 meters—tapped inductor and variable condenser—neon RF indicator—copper plated chassis and high quality components.

Heathkit ANTENNA IMPEDANCE METER KIT



MODEL
AM-1

\$14.50 Shpg. Wt. 2 lbs.

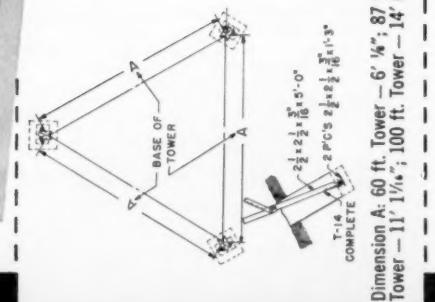
Use the Model AM-1 in conjunction with a signal source for measuring antenna impedance, line matching purposes, adjustment of beam and mobile antennas, and to insure proper impedance match for optimum overall system operation. Will double, also, as a phone monitor or relative field strength indicator.

100 μ a. meter employed. Covers the range from 0 to 600 ohms. Cabinet is only 7" long, 2 1/2" wide, and 3 1/4" deep. An instrument of many uses for the amateur.

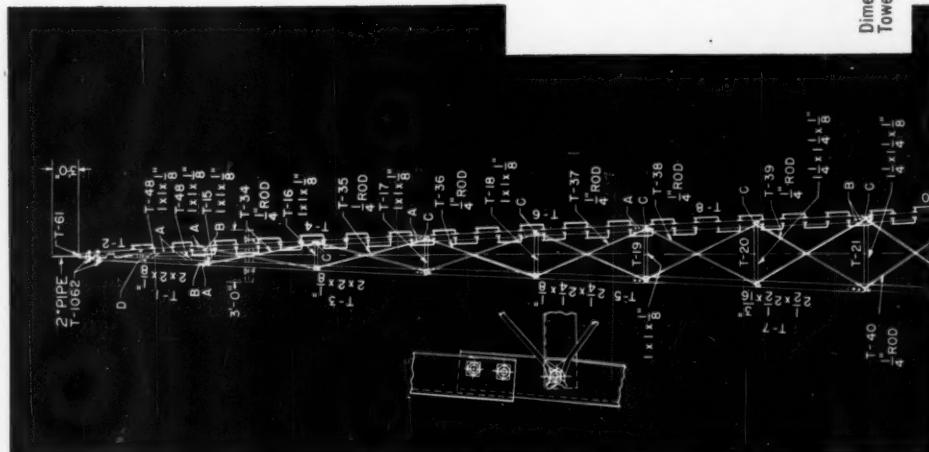
SKY-TOP ANTENNA TOWERS

-FROM COMMUNICATION HEADQUARTERS*

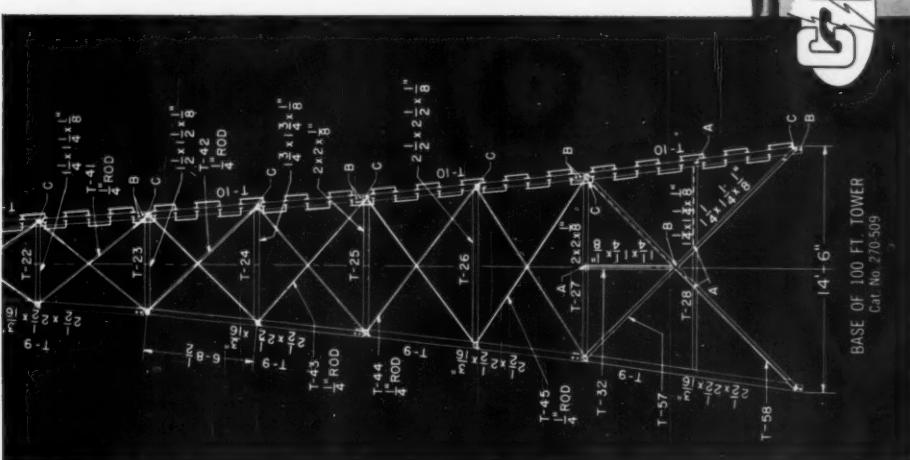
- Completely self-supporting
 - no guy wires needed
- Simple in design
 - for quick, easy erection
- Heavily galvanized
 - after fabrication
- Loop steps on corner posts
 - form solid ladder
- Triangular construction
- Trim, streamline appearance



Dimension A: 60 ft. Tower - 6' $\frac{1}{4}$ "; 87 ft.
Tower - 11' 1 $\frac{1}{4}$ "; 100 ft. Tower - 14' 6"



**Towers
60, 87
and
100 ft.
high
IMMEDIATELY
AVAILABLE!**



These new SKY-TOP towers have countless uses in the communication fields. Their design is such that they may be assembled by non-skilled, inexperienced personnel at low cost. SKY-TOP towers, completely galvanized after fabrication, will render many years of service without further protection. They are capable of supporting antenna structures having a projected cross-sectional area of 6 square feet, centered 3 feet above the tower top, in winds up to 85 mph. Order SKY-TOP towers in three popular sizes: 60, 87 and 100 ft. height.

For complete detailed catalog information, please request Catalog No. 56 on your company letterhead

**Communication Products Company, Inc.*
MARLBORO, NEW JERSEY — Telephone: Freehold 8-1880



BASE OF 100 FT. TOWER
Cat. No. 270509

(Continued from page 70)

FDI are on 2 meters. UTH lost 2- and 6-meter beams during a recent windstorm. PFR has a new NC-300. K2DYC has a new rig on 6 meters with 829B final at 65 watts. AQS and EMW put on a realistic skit for RAGS on "How NOT to be a Lid on C.W." RWJ teaches Electronic Theory at Smith Tech. evenings. The Syracuse V.H.F. Club was addressed by Dr. Seeley, of S. U., on v.h.f. propagation scatter. K2GWN has an NC-300. EMW received a WNH certificate. OZR spoke at an RAWNY meeting on "Lightning Protection." K2EVP is the proud papa of a girl. BTB has been appointed as Air Force MAR8 Director for New York State. Traffic: (Nov.) W2RUT 525, K2DVB 357, WZRC 338, K2L8N 213, IYP 196, HVT 132, W2RUT 88, CXM 58, K2QSH 53, W2OE 45, K2KIR 41, W20ZR 38, K2DJN 35, W2QH 34, K2CUQ 17, DG 17, GWN 16, W2FPW 15, RQF 15, BKC 12, ZHU 7, BLO 4, EMW 4 (Oct.) W2EMW 8, RQF 8.

WESTERN PENNSYLVANIA — SCM, R. M. Heck, W3NC — SEC, GEG, RMs: UHN, NUG, NRE, and GEG, PAMs, AER and LXE/VKD. The WPA Traffic Net meets Mon. through Fri. at 7 P.M. on 3585 kc. The Radio Association of Erie members are looking forward to the time when amateur operation begins from Antarctica early next year. Interest is high because of the participation in the expedition of Erieite Dr. Paul Siple. Several fellow hams aided WJA in raising a new beam atop his garage on a recent Sunday, only to have a big wind bring it toppling down on Wed. W3NB3O has 41 states toward WAS with 30 watts input. Bill Murphy is now W3EBBK. MNP of LJF are vacationing in Bermuda. ZWR has joined the 10-meter contests. High winds damaged antennas at BBO and VHP. WAX is with an A.T.T. in Erie. Mobiles wound up '55 activities by the Christmas Parade. W3NB3ZR, who has contacts in 40 states worked, says that JW is organizing c.d. in Fayette County with 100 on 28,640 kc. TTV is boosting c.d. in Connellsville. VKD will visit hams in 17 countries and expects to operate FM7WV, PZIRM, HC20M, and VP1SD during the coming ARRL DX Contest. WPY made a very good score in the SS while operating VKD on phone. AQS worked on s.s.b. at the Indiana County ARC November meeting. The Allegheny Kiski ARA elected RSR, pres.; WGH, vice-pres.; REK, secy.; SWV, treas.; NCF, WGR, and LPQ, directors. The BSN had about 26 NCSSs on a rotating basis on 29 Mc. during the year. KWH/SVJ won the BSN's recent "uniman" contest. TTR and PIQ 3 also were winners. BSN would like to see more logs in future contests. QYF worked SP9KFD for No. 100. TTR worked his first G. SIR needs only Wyoming for WAS. UJP is going f.m. soon. WFR and RSB are commanded for their work on the Pennsylvania auto license plate law. JT likes his new 75A-4, LKZ, YIT, and SIR are ordering NC-300s. The Washington County ARC reports two members with new NC-300s. UEM and KHY. The Steel City ARC reports. ZVZ, active on 10- and 20-meter phone, says the Mosley beam in J.B. RUZ, all wrapped up in plans, is working on an RC job. ANX is on 40- and 10-meter phone. MPO has a new 20-meter beam. SDV is on 20 meters with a new beam. The Horseshoe Radio Club of Altoona increased activity on 20, 40, 80, and 100 n. eters with light activity on 10 meters. Calls heard from that area are OJX, KQD, BEY, WMM, YOZ, LQD, KFD, TAW, USG, VPF, AFH, LIV, AUD, BVE, ZVA, CHN, ZUG, ZUE, VZX, UBP, and Novices BSR, BTX, BZN, DKH, EGV, CLD, DPH, EDQ, BZG. BSR soon will be on with a General Class ticket. YLs ZUF and BMU are very active. The Bucktail ARC of Emporium is starting code classes at the community center. New club officers are SUL, pres.; PTU, vice-pres.; ZKY, secy.-treas.; RMX, agt at arms, RVS, 2-year director; KUN, 1-year director; VEF, jr. vice-pres.; and WII, jr. sgt. at arms. LAO has a second jr. operator, a boy. ZKY would like more participation in the 10-meter C.D. Net. Traffic: (Nov.) W3NRE 165, YUL 154, ZEG 109, ZEW 89, WQJ 87, KUN 50, YA 48, UHN 43, NUG 24, NCD 10, KNQ 4, NMJ 2, SIJ 2. (Oct.) W3NUG 31.

CENTRAL DIVISION

ILLINOIS — SCM, George T. Schreiber, W9YIX — Section nets: ILN, c.w. 3515 kc., Mon. through Sat. at 1805 kc. RMs: BUK and MRQ. PAM: UQT, EC: HOA. EC Cook County: HPG. Thanks to all of you who voted for me in the recent election. We will try to serve you to the best of our ability. Club elections: Chicago Area Radio Club Council: LYI, chairman; HPG, vice-chairman; MHC, secy.; and YWH, treas. LARK: BCA, HPG, vice-chairman; MHC, secy.; and YWH, treas. LARK: BCA, YWH, IWH, LDK, and Novice TDC. The North West Amateur Radio Club: NNU, RFR, JCX, and DRN. The Calumet Area Emergency Net (CAEN) is seeking traffic stations on 1805 kc. Mon. through Fri. at 7 P.M. Sparkling the Net are UXK, EHY and EH2. The Net publishes a fine bulletin appropriately named *Short Skip*, edited by EHY and DDK. The first Illinois amateurs to receive their call letter license plates were AC, EU, LZ, and CYD, all of whom were instrumental in assisting the matter through the Legislature. BPU and PVD both are sporting new Rangers and HGY a Globe King. MRH is operating from a new QTH.

IDA worked 29 states with a 20A s.s.b. job. JMG has a new 1A-1 final and writes it's the first time he has used a triode. FPK now likes good results with a cubical quad. Happiness to the daughters of BPU and Novice BCY, who were married in November. FNX joined the RSGB so the DX cards will flow in. BRD is trying out another loop antenna. He's going to hit on something yet. The Chicago YLRL reports much interest on the YL Net on 29 Mc. each Tue. from noon to 2 P.M. DPY enjoyed a Mexico and California vacation and also toys with RTTY on 3620 and 7120 kc. The first station he worked was IAW. We extend our sympathy to HKA on the loss of his mother. WZB built a DX-100 and enjoys working it. IBU is going great guns on s.s.b. GAS reports trouble with the band-switching in his Ranger and is looking for help. FRP wrote from Florida, where he vacationed with ZAK, that he enjoyed the Illinois QSO Party and hopes for another soon. What do you think, gang? LL loves his ham antenna problem licked. ZIQ's 2-meter antenna is down but he checks into the Kankakee looking this into a 10-meter dipole. VHY lengthened his feeders and his signal doubled. 4-S units. Active members of the Kankakee 2-meter Net are VQC, VHY, SKN, ZDQ, HKA, LCH, and KLD. OQN, who was appointed Radio Officer for Park Forest, built a new rig to go with the job. The DeWitt County Net is going well at 1 P.M. on Sun. (1805 kc.) to report KXA on the NC-BPL certificates this month go to DO, his twenty-third, and to OR, his first. Congrats to both. Traffic: W91DO 1396, OR 609, MAK 336, IDA 308, MIQ 87, VEY 73, YIX 70, CTZ 52, BUK 46, FRP 36, CEE 26, EHY 26, SME 26, FAW 22, OCB 20, STZ 20, YYG 18, CZH 15, LL 15, LXJ 15, VBV 9/15, SXL 10, KLD 8, YFO 8, USI 6, HPG 5, VSX 4, LRA 3, AMD 2, OQN 2.

INDIANA — SCM, Seth Lew Baker, W9NTA — FWRC mobile units on 5 meters furnished communications for the Armistice Day Parade with 8 units. The mobiles have code class with 36 enrolled and BEM as instructor. BKJ has assembled a DX-100. New hams are KN9BLK at Bedford, KN9BOK at Noblesville and KN9BNW at Columbus. The Hoosier Hills Club has a new shack at Bedford. HPN dropped the "N." K9AWI is new in Orleans. W9NUBX is new in Tipton. KN9AMT has 43 states and 17 countries. DKK is sporting a new Viking Mobile VFO, DDK, ZKX, and ZSW hold OPS appointments. NH reports working all sections in the SS and now is using a 75A-4. MZE plans to attend electrical school at Angola. IMI is on with a 2-meter rig. KN4CJB is new in Evansville and has put in for a 9 call. FII is back in circulation after two operations. EQG gives the IN morning traffic as 124 and evening as 182, for a total of 306. EH2 reports 208 for CAFN. UQP gives QIN traffic as 226 and TQC reports 81 messages for RFN. TT reports a total of 2395 for UTL with over 80 per session. Reporting into UTL for Indiana are JOZ, DHJ, EH2, WWT, TQP, UXK, and TT. AB has an HRO-7. BYV and WAU have DX-100s. The DARA conducts a code class. PSJ acquired a new Gonset 2-meter rig. From EQG we learn that the City of Gary has obtained a bus for a mobile communications center and the locals are revamping it for the job. A new net is the Lake Co. C. D. Net on 147.3 Mc. daily at 1830. NCSEs are PAS and SNF. A new General Class licensee is Ann, MPX, who worked 51 countries in 6 weeks on 15 meters with Ranger and beam. Her OM is HYM. HHN is WAS on 80-meter c.w. with all but Utah as Novices. Those making BPL were NZZ, TT, DGA, and DDK. PNE has a 118-100 record for countries worked. YFD has acquired WAC. Traffic: (Nov.) W9NZZ 205, TT 530, EH2 400, JYO 282, YJO 183, UQP 166, DGA 159, SVL 157, EJO 130, UXK 130, DDK 111, TOC 111, SWD 105, ZYK 88, BKJ 70, NTA 70, KTX 58, VNV 55, WBA 50, AZF 34, EHE 30, QYQ 30, ACW 28, AB 26, LGD 25, SVZ 25, CC 24, STC 22, HRY 19, PQA 17, WRO 15, WUH 15, TG 14, DOR 13, KDV 13, YB 13, ALL 11, ZSW 10, BDP 9, WLY 9, AQR 8, CMT 7, FHA 7, AMW 6, QR 5, YVS 5, GDL 4, NH 4, KDR 3, MZE 3, ZGB 3, FJS 2, NSY 2, PPS 1. (Oct.) W9WWT 113, CTF 66, EHE 39.

WISCONSIN — SCM, Reno W. Goetsch, W9RQM — SEC: OVO, PAMs: ESJ and AJU, RMs: BVG and YZA. Nets: WIN, 3685 kc., 7 P.M. daily; BEN, 3950 kc. daily; WPN, 3950 kc., 1215 Mon.-Sat., 0930 Sun. Wisconsin mobile and c.d. frequency: 29,620 kc. SQM is going s.s.b. with a 20A exciter, to be followed with a kw. final. SAA soon will have 500-watt final on s.s.b. JEF worked his first KL7 and VO4. GHT is NCS for the Northland Teenage Net. KXA is out of the Navy after 4 years, and he and the OM, KWJ, worked mobile in call areas 3, 2, 8, and 9 on the way home. Newly appointed as RM and WIN net mgr. is BVG, with YZA as act. net mgr. IKY purchased an SX-100 to go with his DX-100! CCO has been assigned to Great Lakes by the Navy (Electronic Tech. School) and is operating from home on week ends. DIK has a new all-band antenna. LFP and ZLD are going to kw. AEM and LFP are using new "short-beams." NRP has been appointed as acting net mgr. of the BEN. The Wisconsin Section QSO Party held Dec. 12th produced an FB turnout. W9PJJ dropped the "N." from his call. YRO has 15- and 20-meter beams stacked at 60 ft. IXF is using a DX-100. Ranger, and 75A-3, IXF, ITI, BXB, and YOX are using

(Continued on page 82)

For all-band CW, AM, or SSB take your pick
from **The EIMAC Big Six**
High power, long life, simple circuitry



4X250B radial-beam power tetrode is an amazing compact, rugged newcomer universally interchangeable in nearly all cases with the 4X150A but offering higher power and easier cooling.

	CW	AM	SSB
Plate Voltage	2000v	1500v	2000v
Driving Power	2.8w	2.1w	0

Power Input 500w 300w 500w



4-400A radial-beam power tetrode, the highest powered of the Eimac Big Six, is capable of handling a kilowatt per tube in CW, AM, or SSB operation. Forced air cooling is required.

	CW	AM	SSB
Plate Voltage	3000v	3000v	3000v
Driving Power	6.1w	3.5w	0

Power Input 1050w 825w 900w



4-250A radial-beam power tetrode delivers high power with low drive. A kilowatt plate power input is handled easily by a pair in AM or SSB service and a single tube in CW.

	CW	AM	SSB
Plate Voltage	3000v	3000v	3000v
Driving Power	2.6w	3.2w	0

Power Input 1035w 675w 630w



4-125A radial-beam power tetrode made screen grid transmitting tubes popular. This 125-watt favorite for commercial, military, and amateur application is radiation cooled.

	CW	AM	SSB
Plate Voltage	2500v	2500v	3000v
Driving Power	2.5w	3.3w	0

Power Input 500w 380w 315w



4-65A radial-beam power tetrode is the smallest Eimac internal-anode multi-grid tube. An instant heating filament makes it ideal for deluxe high power mobile as well as fixed station applications.

	CW	AM	SSB
Plate Voltage	3000v	2500v	3000v
Driving Power	1.7w	2.6w	0

Power Input 345w 275w 195w



4E27A radial-beam power pentode gives outstanding performance in all types of operation. When suppressor-grid modulated, it will deliver 75 watts at carrier conditions.

	CW	AM	SSB
Plate Voltage	2500v	2500v	3000v
Driving Power	2.3w	2.0w	0

Power Input 460w 380w 345w

Eimac

Write our Amateurs' Service Bureau for helpful information on Eimac tubes.

EITEL-McCULLOUGH, INC.

SAN BRUNO • CALIFORNIA

The World's Largest Manufacturer of Transmitting Tubes

rotatable dipoles on 21 Mc. KN9ABP is attending Harvard. UO1 is using a pair of 813s at reduced power. VDW has a pair of 803s at 500 watts. ILR is frequenting 144 Mc. occasionally. YOS worked in the SS with 70 watts. DVG has 102 countries worked. CBW was active in the November F.M.T. New officers of the Marquette Radio Amateurs are TWA, pres.; LSK, vice-pres.; RUP, treas.; KN9ASW, secy. They send code practice on 29.2 Mc. Mon., Wed., and Fri. at 7:30 p.m. from ODD, SZR, at the U of W. reports that the club station, GOC, is back on with a DX-100 built on a "round-the-clock" shift by SZR, VOO, ZQA, VAK, KN9BPJ, and 4 SWLs. VOO is in charge of Student Control Center of the C.D. Council. New officers of the Blackhawk Club are LJJ, pres.; IQB, KJJ, and MAQ, vice-pres.; KLL, secy.; LRR, treas. The Outagamie Radio Club has a new meeting room in the County Hi Way Building. YFW replaces NLY on the MRAC Board. FLARC (Madison) held an auction with GPI as auctioneer. 2BDs gave a talk and demonstration on beams. ZC4IE and FB8BR bring KXK up to 151 countries. Traffic: W98AA 217, JEF 190, OMT 57, RQZ 42, YZA 42, RTF 31, BVG 29, SQM 16, GHT 14, KWJ 9, UMJ 9, IKY 8, CCO 7, DIK 7, AEM 4, WN9NHE 2, W9OVO 1. (Oct.) W9RTP 22.

DAKOTA DIVISION

NORTH DAKOTA — SCM, Elmer J. Gabel, W9KTZ — SEC: CAQ, PAM: HVA, RM-FVG. The Phone Net meets on 3845 kc. at 1800; the C.W. Net on 3670 kc. at 1830 Mon., Wed., and Fri. Every amateur should enroll in the AREC. Ask your County EC or the SEC for application blanks. ECs by counties are Benson K9AIP, Bottineau W9IRN, Burke DMK, Burleigh GJJ, Cass CAQ, Emmons UBG, Golden Valley RSA, Griggs ORU, Logan KLP, McHenry GQA, McIntosh K9ASV, McLean W9GQD, Morton ZCM, Mountrail NGO, Pembina HNV, Ramsey QOB, Richland K9ATK, Stark W9NPR, Steele EXO, Trail BFM, and Ward GNS. EC appointments are open in the missing counties. VCYQ traded his Ranger for a DX-100. FVG has been relaying traffic from TEN to CAN. KN9CND has the bugs out of his Adventure and will be happy to sked anyone. Traffic: W9LHB 80, KTZ 59, FVG 46, WRK 36, VCQ 29, UBW 17, GQX 16, BFM 12, HVA 12, EXO 10, KLP 8, K9ATK 5, W9NPR 4, GQD 3, IRN 3, CAQ 1.

SOUTH DAKOTA — SCM, Les Price, W9FLP — SCM assistants are APL, YKY, HOH, GQH, FKE, RMK, TI, MZJ, and KDE. PAM: UVM, RM: SMV. The South Dakota 75-meter evening phone net has been changed to the 75-meter emergency phone net. PRL, the NCS, is going to Washington on Senator Case's staff so UVL and GDE have been made dual net controls and will call alternate weeks. ZWL is NCS for a weather net to collect weather information from isolated localities reporting to the weather bureau and general public. This net had an average report of 11.8. NJQ net, NEO as NCS, had 24 sessions, high 29, low 12, average 12, traffic per session 2.5. The c.w. net, SMV as NCS, had 13 sessions, QNI 86, high 10, low 5, average 6.6, traffic high 7, low 0, average 4. The traffic report for the 75-meter phone net: High 59, low 27, average 3.86 QNI, traffic high 10, low 0, average 2.46, formal high 15, low 1, average 47. The 160-meter net, FKE as NCS, averaged 17.2, 4.2 states, formals 12, informals 56. A new call in Sioux Falls is KN9CYV. The SFARC had a family night Nov. 21st with 77 present. SIR now is in the CAA in Chicago. Traffic: W9SCT 190, SMV 54, NEO 53, DVB 52, RRR 52, PHR 37, BLW 36, MZI 32, GDE 27, UVL 24, OII 15, BQH 12, GWS 12, HOH 4, QKV 2.

MINNESOTA — SCM, Charles M. Bove, W9MXC — Asst. SCM: Vince Smythe, W9GQQ, SEC: GTX, RMs: DQL and KLG. PAMs: JIE and UCV. EXC is building a new rig for 2 meters using a pair of 24GAs. CAE and THY are on daily on 2 meters using modulated c.w. for code practice. The u.h.f. banquet at Anoka was a humdinger, with more than 25 hams attending. The Twin City Area Amateur Radio Council has been discussing the possibility of putting on another Division Convention. How many of you would like another good old Dakota Division Convention next year? WTP, of Austin, is now on the air in St. Paul. APW is a new ham in St. Paul. Your SEC wants everyone with an EC certificate that needs renewal to drop it in the mail for endorsement. SKQ is now sojourning in Florida. TQQ and her husband have returned from a trip to St. Louis and are planning on a trip to Europe. WMA and TQQ each have a new SX-100. PBI is the portable located on North High School in Minneapolis. BWF has a new NC-300. IJN has been visiting in Minneapolis. HAH of Winona, ZXX of St. Louis, and ZSD from Florida are now living in Minneapolis. IRW now checks into the MSN. The Minneapolis Radio Club, Inc., has elected the following officers: RQJ, pres.; VLZ, vice-pres.; IXR, secy.; UYS, treas.; and ITQ, BSI, and TKX, directors. TKX also has a new NC-300. VBS needs only Asia for WAC on 7 Mc. The Wayzata Radio Club is located in the Wayzata High School and is headed by Brian Ford, with YVA, vice-pres.; and Jeanne Buranen, secy-treas. Meetings are held every Mon. at 8:00 p.m. Members are BLA, ZML,

OGM, and YVA. A transmitter is being built for club use. RLD and WDW made BPL in November. VBS is converting a BC-458 for 20 meters and a 500-ke. crystal standard and monitor. The North Star YL Club meets on the 2nd Tue. of each month at the home of one of its members. Club officers are MSW, pres.; QVQ, vice-pres.; BJJ, treas.; QXA, secy.; QXF, asst. secy. The YL Pi Net meets at 0900 CST on 3838 kc. TCK bought TJA's 600-watt rig. Traffic: W9WVO 324, RLQ 266, KJZ 239, KLG 200, QHS 181, WDW 181, DQL 151, VEP 73, UCV 54, LUX 46, MXC 44, WMA 43, OSJ 37, KFN 32, IRJ 31, RVO 31, BUO 21, QXS 20, GTX 18, UBD 16, LST 12, UNJ 12, KNR 11, BGY 10, VOA 10, QVR 7, OPA 6, VEZ 5, TCF 4, UMX 4, NTV 3, TJJ 2, SHU 1.

DELTA DIVISION

ARKANSAS — SCM, Owen G. Mahaffey, W5FMF — The Ozark Academy Amateur Radio Club has a 125-watt c.w. rig on the air. The call is YZI. WTK is home from Colorado and is back on the air. 7BED/5 was on at Gentry and gave us some help on the c.w. net. He has now returned to Utah. TIA reports that he and BHJ, WHU, UEB, OXL, and JBU are active on 50.1 Mc. at Fayetteville, and have carried on communication up to 30 miles operating mobile. Gentry has four new Novice hams, KN5DEJ, DEN, DEO, and DEP. The Arkansas c.w. net joined with the Louisiana c.w. net on 3695 kc. starting Dec. 12th, hoping to stimulate more activity. Traffic: (Nov.) W5SXM 50, CAF 47, NKK 23, FMF 19, IAI 18, VAA 16, W7BED/5 12, W5DAG 8, K5AVE 6, W5WUM 6, ENZ 5, HEE 4, EMN 2, JZL 2, PX 2, ZJJ 2. (Oct.) W5CAF 38.

LOUISIANA — SCM, Thomas J. Morgavi, W5FMO — Shreveport's Caravan Club held a fine hamfest on Cross Shreveport Nov. 20th. Among those attending were BSR, the new Delta Division Director, FMO, Louisiana SCM, and amateurs from Louisiana, Arkansas, Oklahoma, and Texas. G3BM was a recent visitor to the New Orleans Radio Club. HVY is active on 2 meters. The two clubs in Baton Rouge will combine under the name Baton Rouge Amateur Radio Club. The Ark-La-Tex Teenage Net meets on 3820 kc. each Mon., Wed., and Fri. BMD is NCS. HBC is aast NCS and Net Manager. NDV spent 36 hours in the SS. RKO is chief operator at K9FFA. They monitor the Yankee Net on 7290 kc. all day. EA is working on a joint c.w. net for Arkansas and Louisiana. All interested are requested to get in touch with him. K5AJE has 43 states. DJU is waiting for his WAS certificate. EBK is active on 40-meter c.w. MXQ is getting ready to build a 15-meter bamboo beam. He meets RN5, CAN, and MARS regularly. TFQ is a new OPS and is on 10 through 75 meters. WCI is on 40- and 10-meter phone. EDQ helped a YL get her Novice ticket. He operates 40 and 10 meters, phone and c.w. NG sends Official Bulletins on 7175 kc. Mon., Wed., and Fri. c.w. at 1800 CST. BES has worked wonders with the Emergency Net in New Orleans. At the last report he was getting a public service bus for a mobile emergency unit. TKV now has emergency power, ten kw. of it. UQK has a new jr. operator. Get your reports in early next month and accept a Communications Department appointment in your area. Make a habit of monitoring 3905 kc., the Louisiana calling frequency. Traffic: K5FFA 305, W5MXQ 151, NDV 86, EA 68, FMO 20, BMD 3.

MISSISSIPPI — SCM, Julian G. Blakely, W5WZY — SEC: PFC, RM: WZ, PAM: JHS. Congratulations to KYC on being elected as Vice-Director of the Delta Division. Kirk is an old hand at League participation and we know he will do an excellent job for the section and division. Also congrats to our new Division Director, BSR. It sure is a relief to have the new business location, new home, and new shack in full operation. We are now back in business 100 per cent. We appreciate the reports from stations who sent them in while we were off the air, and will appreciate a report from each station holding an ARRL appointment. News will be welcomed from any station in the section, appointee or not. Any information needed or certificates due will be rushed out on receipt of a post card. All hams who will meet our c.w. net, drop us a card for full information. Let's not let Mississippi bottleneck RN5. Traffic: W5JHS 35, EWE 26, GDW 20, OTD 4, WZY 2.

TENNESSEE — SCM, Harry C. Simpson, W4SCF — SEC: RRV, PAM: PFP, RM: WQW. Congratulations to the new officers of the Memphis Club, GQQ, pres.; LYX, vice-pres.; WBK, BAQ, STI, and NZP, directors; FRB, treas. OEZ reports the amended RACES Plan for the Nashville Area has been resubmitted. JVM says K4DVK is probably the first Tennessee mobile to run out of gas and request same via 6 meters! SCF had nice visits with BQG, IIB, PTI, UHA, WQW, and K4WBF. HUT starred as St. Nick in the Little Theater Christmas Play. DMU reports 42 stations on the roll of the Davidson County 10-meter Emergency Net, including two XYLs, K4s DHA and DIZ. WQT sends kind words concerning WQW's fine C.W. Net Bulletin, as do all net members and the SCM. UIO reports a fine total QNI of 301 for the East Tennessee Phone Net, an average of 13.6 per session. While we are speaking of fine net reports, Tennessee C.W. handled 247 messages and averaged 13 stations per session during November. K4BCV

(Continued on page 84)

Performance



is TOPS!

The "Heart" of the PRO-310

Newly developed front-end with three tuned circuits but only one RF tube amplifier provides remarkable selectivity and ultra-high signal-to-noise-ratio.

When you buy communications receivers, you buy performance above all else. And, performance is what you get when you buy the NEW PRO-310. It's the receiver designed with performance in mind. And, the PRO-310 outperforms all other receivers in its class. Here's why—

- Outstanding stability—excellent for SSB.
- Ultra-High signal-to-noise ratio
- Extremely high image rejection—*on all 6 bands*
- Uniformly high signal sensitivity
- Continually calibrated bandspread *over the entire range*
- Dial readability better than 0.05%
- Adjustable band width—350 CPS, 2 KC, and 4 KC
- Coil turret band switching
- Ruggedized construction—sectionalized

Check on the NEW PRO-310—it's made to order for your "tough-spot" service. Write for specs and other details to The Hammarlund Manufacturing Co., Inc., 460 West 34th Street, New York 1, N. Y. Ask for Bulletin Q-256.



HAMMARLUND

Since 1910

is a new ORS. Your SCM welcomes applications for appointment as OO, OBS, OFS, ORS, or OES. The 160-meter Net is going nicely under HH and VJ. UWA is in the process of trading rigs. In the meantime, he is using a 6A67 final and has worked several KVs and KPs with the weenie-watt. TYW reports TCPN traffic at a high level and says the Kingsport RACES Plan should be approved momentarily. The closing date for nominating petitions for SCM is Feb. 15th. Don't forget to sign a petition for your favorite candidate, and don't forget to vote! Traffic: W4OGG 164, IIB 115, WQW 115, VNE 106, TZD 84, PQP 72, VJ 50, TYW 43, TIE 41, YMB 39, SCF 38, HLR 31, PAH 22, WQT 19, JVM 18, UVL 17, HUT 10, HSX 4, OEZ 4, SKH 4, YPG 4, DMU 1, PVD 1.

GREAT LAKES DIVISION

KENTUCKY — SCM, Robert E. Fields, W4SBI — SEC: CDA. PAM: YYY. RM: KKW. Statistics for KPN for November are as follows: 30 sessions, 581 total call-ins, 19.4 stations per session, 79 total traffic, 2.6 messages per session. Looks like the score is on the upswing. The PAM would like to encourage anyone who wants practice as NCS to give him the word. How about it, fellows? Report from the RM as follows shows that KYN also is swinging upward in traffic totals: 70 sessions of all combined c.w. nets, traffic total 258, 3.7 messages per session. The high session, with CDA as NCS, cleared 17 messages in 82 minutes. ZDA was a close runner-up with 16 messages cleared in 80 minutes. There were 49 active stations for the month. PLEASE NOTE: The SEC asks that all ECs, AREC and other net stations stand by on nets KPN and KYN during the severe winter periods. SUD, WVU, and JVJ are building 6-meter rigs. URF/1 says he is fairly active on 10 meters now with the mobile rig and put KUSA, at Fort Devens, Mass., on 15 meters. SBI is building a 10-meter beam getting ready for some DX. Traffic: W4KRW 172, QCD 162, ZDB 102, RPF 83, ZDA 70, CDA 59, SBI 47, SUD 44, NIZ 42, JCN 38, HSI 28, JP 22, SZB 21, K4AGT 17, W4URF/1 15, WMX 14, WBD 9, ZLK 9, JUI 4.

MICHIGAN — SCM, Thomas G. Mitchell, W8RAE — Asst. SCM (Phone): Bob Cooper, 8AQA. Asst. SCM (C.W.): Joe Beljan, 8ACW. SEC: GJH. Many thanks for the fine showing of activities reports and club bulletins this month. The traffic totals are picking up as expected. Several requests have been made regarding new appointments and more are solicited. Don't forget the Noon QMN Net, fellows. Here is a chance for those who cannot make the later sessions. New officers of the Grand Rapids Amateur Radio Assn. are ESR, pres.; LEZ, vice-pres.; OND, secy.; ZCH, treas.; DLE and FCP, activities; GWE, pub. dir.; YDJ, station trustee; and QBA, editor of the bulletin *QRM*. DLZ says that the Annual Midwinter Radio Convention (Grand Rapids) will be held on Mar. 3, 1956, at the Rowe Hotel. Big plans are well under way and this should be even better than the 1955 Convention. The Blosomland Amateur Radio Assn. became incorporated and the new officers are FGB, pres.; QOO, secy.; QOD, treas.; QOT, act. mgr.; PT, dir.; and ORM, publicity dir. They have started to publish a new bulletin known as *Q7X*, which enjoyed a very interesting first issue. It is a project to which all members can contribute. Here's wishing them continued success. The recent election in the Edison Amateur Radio Assn. produced the following elected slate: EQY, pres.; WEL, vice-pres.; ILP, secy.-treas.; and IWG, act. mgr. Many clubs and groups are reporting activity in the form of drills with mobile and base stations. This is a wise move in view of the fact that the Michigan RACES Plan has been formally approved and adopted. It is only reasonable to expect that all members of the Michigan section will have access to this plan by the time this report is published. Please make every effort to familiarize yourselves with its contents. Any questions regarding same should be directed to your EC or to the SEC. Traffic: (Nov.) W8NOH 300, ELW 139, NUL 115, QOO 111, RTN 89, ILP 85, IJU 74, PFA 72, WGU 71, ZLK 68, QIX 53, IKX 50, SCS 42, SCW 42, SIB 40, PDF 29, FX 22, RVZ 22, RAE 18, PHM 17, SJF 17, DSE 16, JYJ 14, QKE 12, FWQ 11, TQE 9, PDF 8, AUD 6, DLZ 6, EGI 6, WKO 6, MLR 4, HKT 1, WVL 1. (Oct.) W8PWA 57, SCW 40, SJF 16, OCC 12, PDF 4, NSS 1.

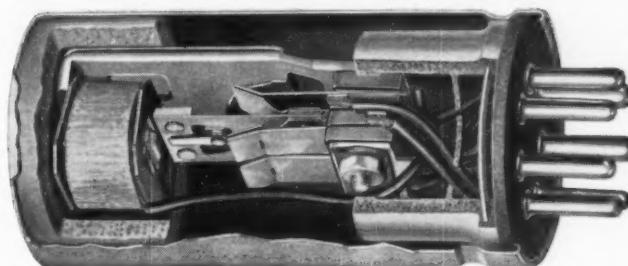
OHIO — SCM, John E. Siringer, W8AJW — Asst. SCMs: J. C. Erickson, 8DAE; W. B. Davis, SJNF; and E. F. Bonnet, 8OVG. SEC: UPR. PAMs: EQN and HUX. RMs: DAE and FYO. At this time your retiring SCM wishes to thank all the Ohio amateurs who helped make his term in office pleasant ones by their splendid cooperation. Two well-qualified candidates, AL and HUX, ran for the office of SCM, with AL winning the election. My congratulations to both of them for the amount of votes they were able to obtain; the total vote far exceeded that of any previous election. AL is a genuine old-timer, and I feel certain that the amateurs of Ohio will do all they can to assist him in maintaining or bettering the level of activities in this section. OHO has been made an OO Class IV. JDN has received his Extra Class license. HGC/HGB is a new OM/XYL combination in Coshocton. Ex-4EFJ is now

GYO. OPV, OPU's XYL, has returned to the air. The MVARA is building a club house at Central, LMB has recovered from a siege of illness. BEW worked FABDA on 7 Mc. TZD made 564 QSOs in the SS with limited operating time. MCC's station was knocked out by lightning Nov. 16th. AQ is doing well with his new 803 grounded grid filter. SWZ is s.a.b. on 3.8 and 14 Mc. QXH has been back in the nets since the conclusion of the football season. WN8BDH has worked KH6 and 41 states. The CACARC will sponsor a summer picnic in the Cleveland Area. Also a 10-meter groundwave contest will be held in the spring of '56, with AJE serving as chairman. OVG reports newly-elected DARA officers as WYL, pres.; RCA, vice-pres.; DHJ, treas.; QFA, secy.; and ACE, dir. New Westport Radio officers are HFE, pres.; OPX, secy. and treas.; and ACD and ZEU, trustees. The Dayton *RF Carrier* reports that a local V.H.F. Contest was held Nov. 12/13. OVG's Novice and Technician Class exam periods are progressing favorably; and the Queen City "Guest Night" of Nov. 4th brought out over 150 DARA members. The Toledo *Shack Gazette* informed that TQY was winner of the last mobile transmitter hunt, with MQQ finishing second and JKR in third place; the HYE were visited by the stork on Oct. 17th; and BGU has worked his 80th country on 10 meters. According to the GACAR's *Mike & Key*, a trip through the RCA Tube Plant was held on Dec. 6th. The OVACR's *Ether Waves* states that there are now 30 members in their 50 or Better DX Club with JIN leading the pack at 253, BRA at 250, and BTI at 246. The DX column in this publication still is the best that the writer has ever observed in a club publication. The Fort Hamilton *Freeline* mentions that QJO is operating a.s.b.s.c.; HXB has installed a new vertical; the club will award a trophy to their high SS scorer in future years; and HFY is the area's most recent Novice. The Hocking Valley bulletin reports that LGR worked a W6 on 75-meter phone; PFP is the club's newest member and EEQ's son received the call WN8HFK. The Columbus *Carascope* tells us that UPS received his PhD degree; VHO runs 400 watts on a.s.b.c.s.c.; HUE worked over 50 countries in 2 months; and WXY has moved to Pittsburgh. Eastern Ohio's *Ham Flash* reports new WARA officers are OKC, pres.; KCE, vice-pres.; and PBW, secy.-treas.; JWB has moved to Millville, Penn.; a DX contest is being held in the Salem Area; ANW was elected president of the Cuyahoga Falls Club with HQZ, vice-pres.; QYF, treas.; and PAB, secy.; and WNSF has worked 22 states. Traffic: (Nov.) W8AGZ 321, VTP 299, UPB 258, DAE 207, IIR 93, OPU 78, HUX 50, AJW 41, HDA 37, HPP 36, PLQ 36, AL 32, CVZ 24, RO 23, LER 18, WAV 18, ZAU 17, HNP 16, AJH 14, HZJ 13, BEW 12, ARO 11, RN 9, EQN 8, CGF 6, EEQ 6, WYL 6, PBX 5, QXH 5, MGC 4, BUM 3, CTZ 3, AQ 2, BLS 2. (Oct.) W8AGZ 309, DG 80.

HUDSON DIVISION

NEW YORK CITY AND LONG ISLAND — SCM, Harry J. Dannels, W2TUK — SEC: ADO. PAM: NJL. RM: WFL. Section nets: NLI, 3630 kc. nightly at 1930 EST and Sat. at 1915 EST; NYSPEPN, 3925 kc. daily at 1800 EST. WFL reports increased traffic and membership in NLI, but outlets still are urgently needed in the Bronx and Suffolk. Sweepstakes activity in the section was excellent, with your SCM contacting sixty N.Y.C.-L.I. stations on c.w. alone. K2KXZ makes BPL for the second time. Club officers at Columbia U., AEE, are K2CUI, pres.; K2DPG, vice-pres.; K2JYD, secy.; K2CUI, trustee; and LRA, ed. & coordinator. K2DEM now has a Communicator II. The boys at K2GRQ are enjoying 2-meter operation through the courtesy of RB, who loaned the school a Communicator. K2AMP is now building 144-Mc. gear with a look into 220 and 420 Mc. planned for the future. K2CUI is using a Viking I, TVI suppressed, EC has new Viking II in operation and is enjoying all-band phone-c.w. work. LGK suggests a reunion of all NLI Net members. How about a ten-year dinner commemorating the work from '46 to '56? IAG has set up a telephone alert for the Queens 10-meter Net. OBU has a crystal-controlled converter for 144 Mc. and is modifying an ARC-5 for that band. PF would like to start an a.s.b. traffic net. How about it? K2ECY is building 2-meter gear and a transistor VFO. K2DDR finds 10-meter c.w. open and his nine-watter snags several countries. EEN has a new SX-100. New officers of the Wantagh RC are DQN, pres.; LID, vice-pres.; and G. Wilkinson, secy.-treas. EK has been appointed disaster chairman for the Wantagh Red Cross Branch. JCA participated in the F.M.T. and is building a new shack and kw. mln. K2CMV's first operation on 21 Mc. netted four new states towards WAS. K2LYC received his General Class ticket. K2EWJ is on a.s.b. The CCNY Club station HJ is on 2 meters. K2KRB has 75 watts on 144 Mc. into a tenelement beam. K2PHB dropped the "N." New officers of the Radio Club of Brooklyn are PF, pres.; CCW/KW, vice-pres.; BKP, secy.; AA2, treas.; and AGW, DAK, HDV, and K2EIB, directors. K2PJE is now in Farmingdale and plans experimental work on 420 Mc. Six-meter activity is increasing rapidly in all parts of the section. In Nassau, activity centers on 50.25 Mc., where (Continued on page 86)

MALLORY HAM BULLETIN



NEW

Mallory Heavy-Duty Vibrator

features unique design for longer life, constant output

The internal mechanism in the new Mallory Series 1700 vibrator is so different from any other that we thought you should have a close look at it. Notice that there are *no* conventional button contacts. Instead, the make-and-break action is done by special alloy leaves, which serve both as contacts and as spring elements.

This construction provides a contacting area *as wide as the spring leaf itself*. It also eliminates the extra weight of the usual button contacts, making a lighter, simpler assembly for the driving coil to move. The result is a considerable improvement in vibrator performance.

**Your ideas may win money
in the new Mallory Contest**

Have you ever put Mallory components to work in unusual ways in your experimental circuits or amateur rigs? Send us details about applications you have made of Mallory components to simplify equipment, make it more useful or versatile. The most interesting entries will receive an award of \$25.00. Winning entries may be used as the subjects of "Mallory Ham Bulletins." Just send details of your application to the address below.

Consistently longer life. On heavy duty cycle tests, the new vibrators give up to 100% longer service.

More constant voltage. The larger contact area reduces the rate of erosion of metal. Contact spacing stays more constant . . . output voltage holds steadier.

Sure starting. Because contacts are lighter, they can be spaced wider to prevent start-up flare, without need for greater driving power.

High uniformity. The new, simplified design uses fewer parts . . . is made to exceptionally uniform characteristics.

You'll find the new Mallory vibrator just right for powering two-way mobile rigs and other heavy-duty battery operated gear. This design is available in the split-reed type shown here for 6/12 volt service*, and in a Duplex heavy-duty model without the split-reed construction. Your local Mallory distributor is stocked to serve you promptly. See him soon . . . and write to us for a complete catalog of all Mallory precision components for amateur experimental use and repair work.

*Use dropping resistor in series with drive coil for 12 volt operation

P. R. MALLORY & CO. Inc.

P. O. Box 1558

INDIANAPOLIS 6 INDIANA

P. R. MALLORY & CO. Inc.
MALLORY

the AREC Net meets on Tues. at 1930 EST and Thurs. at 1930 and 2300 EST. UVX joined the married ranks. KN2GO is active with an a-s-b, a Q-5er, and an 807 rig. Ex-RTZ, now 8UFZ, and SUKV are the proud parents of a baby boy. The Levittown RC now boasts of 99 members. K2EVE has a Communication on 50 Mc. from Staten Island, and would like to know of other 6-meter activity there. WFL is constructing a 300-watt final. 3ZVV/2 operates mobile from Amagansett. GF is building a 20A and VFO for a b. OBE now has a Viking DU and Matchbox. LVN is on 75 meters with an 814 final. Ex-JBP is now K6MTX, ex-UCB now 9V5Z, and ex-UTB, now 7DTC, are looking for the N.Y.C.-L.I. gang on 14 Mc. QBS, now in Korea on business, listens for familiar W2 calls on 20 meters. TUK completed a sideband slicer and Q-Multiplier. RB added a 20A and kw. linear amplifier. Traffic: W2KEB 1226 KFV 1304, K2KZ2 301, CQF 251, W2AEE 182, K2DEM 176, W2VDT 121, WFL 103, K2AMP 88, ABW 76, W2DSC 72, TUK 62, K2CU1 46, GHS 45, W2GP 43, EC 23, LGK 19, IAG 9, DUS 8, OBU 8, PF 8, K2ECY 6, W2IVS 2, K2DD1 1.

NORTHERN NEW JERSEY — SCM, Lloyd H. Manamom, W2VQR — SEC: IIN. PAM: CCS. TRMs: NKD, EAS, and CGG. K2QEP reports the Tri-Net, 0700-0730, on 3687 kc., is picking up new members every morning. K2GFX made WAS for the first time. K2KLR is working on a new antenna for 14 Mc. HXP is active in RACES work. YGM is doing a fine job as chief theory instructor for the Irvington Radio Amateur Club. K2EMN is the code instructor. K2BXN is finishing up his first semester at Oregon State. He would like to bear from the old gang, so how about dropping him a line. GUV has a kw. rig on 20-meter s.s.b.; a 32V-3 on all other bands. K2DSW and W2NIY have been QRL for the past few weeks. CFB still is plugging to get the bugs out of his DX-100. K2CHI is doing a bit of DX work from his portable QTH. EWZ would like to handle traffic on 40 meters. The Morris County RACES Control Center had a fine write-up and picture spread in the *Newark News*. Congrats to Radio Officer K2DO and his deputy, K2QOP. VMX has a new antenna up with the help of K2GTX. BRC is slowly recovering from the SS Contest. K2KHZ is doing a fine DX job with his Globe Scout. Dave has a new all-band rig in the making. BDS was speaker at a recent meeting of the Irvington Radio Amateur Club. The topic was "Beamed Power" antenna arrays. It was an open-form type of meeting enjoyed by all. KN2LIU and LIW have both obtained their General Class licenses. LIW is the XYL and LIU the OM. KN2LIV also made General Class. The Freehold RACES group is planning a hidden transmitter hunt with prizes for the winning teams. OOG is in charge of the event. PWX and K2IPR are new OES appointees. NIE was heard mobile on 144 Mc. on the way to the deep forests of South Jersey on a hunting expedition. "Hams on Skates" is the title given to the outing being planned by "Annie" of K2ICE fame. The indoor ice rink at Asbury Park is the place of gathering for the 144-Mc. gang, all of whom are expected to appear at the center ice on skates. Age is no excuse for exemption. This is a new idea for winter activity by club groups. K2HNA is pounding brass for a change. K2DHE is all set up at his new QTH. OUS has a new DX-100 and is doing a fine job with the new rig. K2IPR is planning a new 8-meter rig. Traffic: W2EAS 272, K2GFX 40, W2BRC 34, K2EQQ 20, W2CWV 12, K2KHZ 11, W2VMX 10, HXP 9, NIY 5, CFB 3, K2CHI 3, DSW 2, W2EWZ 2, GUV 2, K2KLR 1.

MIDWEST DIVISION

IOWA — SCM, Russell B. Marquis, W9BDR — ILY used his mobile to notify State Police Radio at Des Moines and the local power company that the police radio at Britt was off the air because of ice. Prompt action by several monitoring stations aided in getting the station back on in short order. New appointments: HWU and KJN as ECs; USQ as OES and OO; NGS as OPS. Endorsements: FKB as EC, SCA and BDR visited the Spencer Club. New officers of the Club are CQL, pres.; ZDT, vice-pres.; FNJ, secy. The Waterloo Club made a peace offering to their XYLs with a Christmas dinner. Officers of the 160-meter Net are: BTX, pres.; CGL, vice-pres.; NVK, secy. BSG has a new 500-watt rig on the air. Congratulations are due to NWX and GQ, the new Midwest Division Director and Vice-Director. QZB and ZAM gave an a.s.b. demonstration at the Mason City Club. Ex-YTA, now K6HIZ, was back in Iowa for his mother's funeral. CVU now has a 75A-4 and a KWS-1. NRP covers 17 miles over hilly country with 1 watt on 230 Mc. GZ returned from a trip to California and worked 10 band mobile while en route. LCX now reports into TLCN. K9DDW is a new OM at Red Oak. SQE has an HQ-140. Traffic: Nov. 1, W9BDR 1584, PZO 1467, SCA 1287, BJD 465, CZ 277, LCX 358, SQE 350, LGG 183, LJW 124, GVA 120, BLH 49, UOY 37, TET 30, EHH 26, PKT 24, UTD 9, NGS 16, PTL 1, UWF 14, EFL 12, HNE 12, NYX 11, UHO 11, WPM 11, WVK 11, KJN 10, VWF 9, PAN 7, K9WAD 7, W9DPI 6, K9BPR 5, W9BSG 4, FNR 4, GKN 4, GQ 4, SRQ 1. (Oct.) W9FDM 2.

KANSAS — SCM, Earl N. Johnston, W9ICV — SEC:

PAH, RM: FEO, PAM: FNS. The Wheat Belt Radio Club of Herndon held a regular meeting Nov. 13th with 15 members and more than 50 XYLs and Jr. operators present to hear EXU of McCook, Neb., talk on antennas. EOT has left for the Service. The KFN and QKS will pass Jim's FB operating and traffic totals. FDJ, FEO, and NIY made BPL, RXM, or Fort Scott, is looking for some 6-meter activity. Twirl your beams about 2000 each week night and you might hit some of the Kansas boys. ABJ has a new mobile antenna that tunes all bands from the driver's seat. On Nov. 26th and 27th amateurs in Topeka, Emporia, Ottawa, Lawrence, Manhattan, Junction City, and Council Grove furnished communication for the Jay-Cees and WIBW-TV. KVRC of Topeka, using CET, NI, KXB, WGM, K9AIA, and QJC as fixed stations with 2-meter links to WIBW-TV, took the incoming traffic from WIZ (Neosho Valley Club), KFU at Ottawa, UNT (Lawrence Amateur Radio Club), PAH at Manhattan, BLI, with CV helping at Junction City, FDJ at Council Grove, and FLZ, with JLZ, at Osage City. Thanks to all who did such a marvelous job. Incidentally, UPU was the coordinator of all these set-ups and has received many favorable comments on the service performed by you amateurs. Traffic: (Nov.) W9OHJ 356, NIY 298, FEO 255, QGG 218, BLI 172, FCE 165, FDJ 156, LBJ 101, KSY 71, YVM 67, FNS 66, ABJ 58, DEL 45, ECD 45, RXM 42, SAF 42, UAT 29, EOT 10, LQX 13, TNA 13, VFC 11, ONF 10, WJB 10, LOW 8, K9NAQ 6, K9AHW 3, W9CYK 3, VGE 2, VNL 1. (Oct.) W9EOT 20, SVE 14, UUS 10, K9C1Y 2, CCP 1.

MISSOURI — SCM, James W. Hoover, W9EPE — SEC: MFE, PAM: BVL, RM: OUD and QXO. SAK reports that an amateur radio club is being formed in Jefferson City. RTO has an SCR-522 on 2 meters. The following EC appointments have been made: W9VTF, Howard County; K9ACK, Audrain County; K9BDT, Chariton and Randolph Counties. IJS received an OO appointment. The Bandhoppers Radio Club held a dinner with 9 members and their XYLs present. The Missouri Emergency Net, 3900 kc., on Mon., Wed., & Fri. at 1800, needs stations in the far southeastern part of the State. The Missouri Net, 3580 kc., Mon. through Fri., at 0700 and 1900, needs stations in the northern part of the State. ECE received an SWL card from Poland while running 50 watts on 80-meter c.w. Officers of the Shawnee-Mission High School Radio Club are VVZ, VBG, VXA, and WJC. KIK reports that BAF has a collection of old-time ham equipment. The MO-REB Amateur Radio Club held a dinner party with 14 in attendance. DFV has a new B&W 5100. ETW has enrolled in graduate school at Washington U. An article featuring CPI was carried in the *St. Louis Post Dispatch*. CPI has made BPL consecutively for the last 38 months. Traffic: (Nov.) W9CPI 1297, GBJ 528, OMM 200, BVL 172, SAK 114, CKQ 72, RTD 59, WFF 49, OUD 47, KIR 41, RTW 40, VWZ 31, KA 20, WAP 20, HUI 19, VTF 18, GEP 16, ECE 15, VPQ 14, K9BDT 12, W9VFP 7, EBE 3, MFB 2. (Oct.) W9HUI 7, (Sept.) W9ETW 2. (May) W9OOD 79.

NEBRASKA — SCM, Floyd B. Campbell, W9CBH — Aast. SCM: Tom Boydston, W9YX. PAM: HTA. SEC: JDJ. K9PCDG is the first amateur in a Midwest receiver for 80 and a BC-455 for 40 meters and is a new member of the NSS Net. ZJF has earned his first BPL. MAO is NCS of the Nebraska 75-meter Emergency Phone Net and was the happy recipient of a new 45-ft. doublet cut for the Nebraska Net frequency. FTR, GVA, SPV (Lincoln), VGH, ZWF, ZWG (Seward), 5TQQ, and K6DWD (MARS operator at K9FDU, Lincoln Air Force Base) collaborated in the erection of the new skywire. The 75-meter Net is ready to give any further assistance to assure a potent NCS signal. DDT traded the Viking II for an 813 rig. CIO is on the Nebraska C.W. Net, the Nebraska 160-meter Phone Net. AIN is on the Nebraska C.W. Net. DDT is on the Nebraska C.W. Net, the Nebraska Phone Net, and TEN. ZJF is on the Nebraska C.W. and Phone Nets. TEN and CAN. The Ak-Sar-Ben Radio Club is now incorporated. The Johnson County Radio Club officers for '56 are DEL, pres.; GVA, vice-pres.; OYY, secy.; CLA, treas.; QYP, act. mgr.; OJW, tech. chairman; and NCK, publicity and public relations. Congratulations and a successful New Year. Traffic: (Nov.) W9ZJF 586, CIO 387, DDT 147, FTQ 136, AEM 56, EGQ 48, LJO 39, KDW 38, MAA 38, ORW 32, ERM 22, K9FB 19, W9NPK 18, OOX 17, GVA 14, VRE 12, OCU 11, K9PCDG 8, W9EFV 8, RMO 7, VYX 6, CBH 4, DJU 4, GTW 4, IAY 4, K9MBY 4, W9QOU 4, SZL 4, VGH 4, WYK 4, ZOU 4, KLB 3, PON 3, UJI 3, ZWC 3, AIN 2, BEA 2, BOQ 2, K9PCDG 2, W9IRW 2, PNY 2. (Oct.) K9PCDG 2.

NEW ENGLAND DIVISION

CONNECTICUT — SCM, Milton E. Chaffee, W1EFW — SEC: LHK, PAM: LWW, RM: KVQ, MCN and CN, 3640 kc. (0645 and 1845); CPN, 3880 kc. (1880, Sun. 1000); CTN, 3640 kc. (Sun. 0900); CEN 29,580 kc. The late session of CN (2100) has been abandoned for lack of traffic and participation. CN conducted 26 sessions with total traffic 271. KYQ, RGB, and LV were top reporters. MCN worked

(Continued on page 88)

6-METER Equipment



Communicator

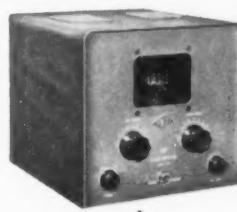
This complete station package puts you on six in a hurry! For fixed—or mobile—expect and get performance comparable in every respect to larger sized communications equipment suitable only for fixed station.

The excellent receiver features "Cascode" RF for high sensitivity, dual conversion for image rejection and added selectivity useable on six meters. Gonset noise limiter and adjustable squelch contribute greatly to outstanding overall receiver performance. Tuning range includes 49 mc BC band to assist in spotting band openings.

Transmitter uses 2E26 final to provide power output of 8-10 watts with high level modulation. Power supply is self-contained, universal for 6 volts, (or 12V) DC as well as 115 volts AC.

DE LUXE MODELS:

6V DC/115V AC, #3049 net 229.50
12V DC/115V AC, #3058 net 229.50



Linear Amplifier

A complete, self-contained unit that can be quickly added to your 6 meter Communicator, (or other 6 meter, 5-6 watt AM modulated equipment) to increase POWER OUTPUT to 50-60 watts!

Easy to install, simple to adjust, fool-proof in operation. Requires no circuit alterations on companion Communicator. Antenna relay is built in, as is heavy-duty 115V AC supply.

Uses push-pull 826 triodes with forced air cooling. (Tubes supplied.)

Standard models of this excellent amplifier are also available for 2 meters. Other models for commercial, government, aircraft frequencies can be supplied on special order. Your inquiries are invited.

6 METER LINEAR net 149.50

SEE THEM AT YOUR
DISTRIBUTOR.



Converter

This sensitive new converter for six meters operates in conjunction with conventional auto BC receivers, with communications or broadcast type home receivers. Frequency coverage is from 49 to 54 mc, spread over a full-vision calibrated dial. Tuning knob has planetary drive with step down ratio.

Unit has switch to permit operation of heaters from 6 or 12 volts. "B" power is obtained from companion receiver.

The famous Gonset noise clipper is built into the converter cabinet, operates as a separate entity with receivers that do not have noise limiting. Connections are simple and straightforward.

This small size, ruggedly built converter is mounted readily on steering post.

net 47.50

also
FOUR ELEMENT
BEAM
and

"COMMANDER"
TRANSMITTER

includes 6 meter band.



GONSET CO.

801 SOUTH MAIN STREET, BURBANK, CALIF.

"10's
coming
back!"

...and you'll
be ready!

with a

mosley

"V-P"

**TEN METER
ROTARY BEAM**

the 'TEN-TWENTY'

Two complete three element beams mounted on one boom and fed with just one coax line. Typical performance; 7 1/2 db. forward gain, 28 db. front-to-back, 1.5/SW or better on both ten and twenty meter bands. 12' aluminum boom, 22 1/2" max. element length. 57 lbs. assembled weight. Pretuned.

\$120.79

Model VPA-1020, Ham Net ..

10, 11 or 15 Meter "V-P" BEAMS

Compact, lightweight rotary beams of exceptional efficiency. Can be assembled for operation in any one of 3 bands - easy to re-adjust for another band! Turn with TV rotor. 2 element model provides up to 5 db. forward gain; 3 element model, 7 1/2 db. Heavy duty all-weather construction.

Model VPA1015-2, 2 element, Ham Net \$39.89

Model VPA1015-3, 3 element, Ham Net \$59.68

Convert your 20 meter V-P beam to a '10-20'

Your present 3 element 20 meter Mosley "V-P" Beam can be easily converted to a "Ten Twenty" with this complete kit.

Includes ten meter elements, coils, Auto-Lectronic Coupling Yoke, necessary hardware and instructions. **Model VPA20-1020**

Ask Your Ham Equipment Supplier or write direct for free Mosley Cat. H-56.

54.43

Mosley Electronics, Inc.

8429 ST. CHARLES ROCK ROAD, ST. LOUIS 14, MISSOURI

22 sessions with 98 messages and QNI honors to IBE, RFJ, and RGB. A nice note was received from RAN/4, who still is sweating it out at Ft. Bragg working K4WEVE, including 18 hours in the first half of the SS as 1RAN/4. An FB bulletin arrived from the Middlesex Club describing its activity and doings. EGS has a new Viking Ranger. EGX has a new rig for mobile on 10 meters. QPD has new final and tower. Officers at MRA are EGX, pres., EWD, vice-pres.; QMB secy.; WRO, treas.; and QPD, activities. HCZ is a new Novice/Tech. Class licensee at Milford. WHL has opened up on 6 meters. BVB resumed activity on MCN while his broken knee was mending. YBH and AW hit BPL this month on origins plus deliveries. RFC received a WAMI (Worked All Maine) certificate and also a sticker for QSOs with all 67 New England counties. A nice bulletin was received from the Tri-City Council produced by TVN, its secretary. QDI is a member of Operation Deepfreeze. The Council is working on a plan for a Worked All Connecticut award. GIX and TD maintain their OBS skeds. Hope all interested in call letter license plates have applied by now. If not, request application forms from the Hartford Office of the Motor Vehicle Dept. immediately. The cost is \$10 plus the usual \$8 registration fee. Plates are effective with the 1956 registration. It was a tough nut to crack so let's show we really wanted 'em. How about more club reports for this column? More than half the clubs in Connecticut have never sent in a word. KV, RAN, NLM, JTD, RWS, and AYC renewed ORS appointments. NLM, ODW, and ABZ renewed EC appointments. New ECs: PRT and MRP. New OO: FTX, Traffic: WIAW 327, YBH 252, KYQ 160, NJM 154, RGB 135, AYC 110, LV 80, EFW 73, YNC 63, TYQ 61, RRE 40, BDI 39, RJF 33, CUH 28, BVB 26, GIX 13, KV 11, UED 7, GVJ 5, JTD 1.

MAINE — SCM, Allan D. Duntley, W1VYA/BPI — SEC: TVB, PAM: WTG, RM: EFR. The Pine Tree Net meets on 3596 kc. at 1900: the Barn Yard Net Mon. through Sat. on 3990 kc. at 0800-0930; the Sea Gull Net Mon. through Sat. on 3940 kc. at 1700-1800; the Teen Age Forest Net Sat. and Sun. on 3900 kc. at 1000-1100; the State C.D. Net Sun. on 3993 kc. at 1100-1200. YDX is looking for contacts on 6 meters. New Augusta stations to look for are HWB, WNIHHE, and WNIHTE. Congratulations to BOC on becoming a grandfather. BKO is now chief engineer at WCME in Brunswick. SCM keeps the pictures in focus at WCHS-TV. WXG has a novel way to hook up balun coils. CPS is on s.s.b. with a "killy willy." The "Golden Voice" now is on with her own call-HFL. Congrats to you, Gladys. No need to bother with being a Novice first. If she can do it, why can't the rest of you girls? 2GHR has an amateur TV station on Mt. Washington. Won't some of you Nebraska boys give WTG a contact so he can get his WAS on phone. Traffic: W1WTG 106, LKP 104, UDD 58, EFR 43, QUA 38, NXX 37, BDP 13, JIS 13, VBU 3, BBS 2.

EASTERN MASSACHUSETTS — SCM Frank L. Baker, Jr., W1ALP — New appointments: ZDN as EC for Medford, IPA as ORS and an EC for the Boston Metropolitan Chapter of the Red Cross, KIUSA as ORS. Appointments endorsed: BL as SEC; IAE Sharon, MB Scituate, SMV Cohasset, MCE Boston, WLU Watertown, IAP Lexington, VAN Norwood, and VVS Weston as ECs; GDY as OBS. Heard on 10 meters: MJ, BAB, JSS, EMZ, IBY, ELE, LMP, NVB, SVU, and 3UAU/1 mobile. Heard on 2 meters: AMK, AEL, UBF, JTU, FEY, ELA, and EQU. Heard on 75 meters: CUW, TQS, at 3AD0, HJP, and 4YKB/1. ONZ is going to the Pacific. WNIIGAI, Concord, is on 40 and 80 meters. NBT is the new c.d. director for Holbrook. ALP, YYG, and CLF attended a meeting of the Cape Cod and Islands Amateur Radio Assn. at Hyannis. BL says someone is bootlegging his call on 20 meters. New officers of the North Shore Radio Assn. are VMD, pres.; JLN, vice-pres.; YYJ, secy.; OTK, treas.; ADD and SHV, dir.; VHF, ham tamer. WNIIGIS is new in Chelsea on 40 and 80 meters. The T-9 Radio Club held a meeting at HBG's QTH. FEC is on 2 meters with a 522 and a five-element Yagi antenna. WNIQFA is new in Cohasset on 80, 40, and 15 meters. SEJA, the operator at KIUSA, says they are on 15 meters now with a BC-610. HVQ, an ex-K2, now is in New Bedford. HBM is going after WAS. DLY has over 2000 QSOs on 80-meter c.w. ZE has retired from station WNBH. DIR is now General Class. CNT has a DX-100. LAZ has a new QTH. WGN has a new 51008 B&W rig. SSS worked Hawaii on 10 meters with his old TBS-50. ME has 75-A1, 2, 3, and 4. THO, our 6-meter PAM, sends in the following: K2LXI/1 is in Cambridge. FZJ's son is WNIHIV and his XYL is HOY. The Huntzman family of Wakefield have their tickets; ms is EKC, pa is EKD, son is EKE. ATP is enjoying duplex/6 with LIY on 2 meters. CDR is in the c.d. group in Lexington. Ex-1PIU is now 3EDW. VYB moved to Nahant. PZA is in Gloucester. New calls on 6 meters are BLT, CEI, CHU, DVG, GPT, WUL, WXA, ZNG, and ZTO. Others heard are BWJ, DEL, FCZ, HOM, IVC, KLC, PRC, RLF, RMF, UZZ, WYC, WJE, and URG. DNO is now on at 7:30 P.M. with a code machine on 52.35 Mc. during the week. The Night Owls are on at 11 P.M. or 2300. BB held the annual Winthrop ham get-together at its QTH. DEL is running a code class every Fri. night at Town Hall C.D. Hq. in Winthrop. The last drill had DEL, DPN, AGB, BOX, CMW, DJ, OIR, GBI, DLY, DQF, EAJ, HFJ, MQB, TEO, DGY, BDU, and BB

(Continued on page 90)

SPOT FREQUENCIES
FOR

Amateurs and Experimenters



Holders: Metal, hermetically sealed, available in .093 dia. pins (FA-9) or .050 dia. pins (FA-5).

Frequency Range: 1500 KC to 90 MC.

Calibration Tolerance: $\pm .01\%$ of nominal at 30° C.

Temperature Range: -40° C to +70° C.

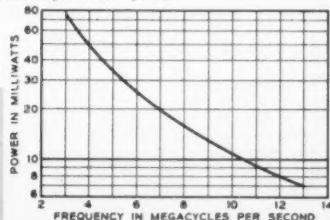
Tolerance over temperature range from frequency at 30° C.: $\pm .01\%$.

Circuit: Designed to operate into a load capacitance of 32 mmf on the fundamental between 1500 KC and 15 MC. Designed to operate at anti-resonance on 3rd overtone modes into a grid circuit without additional capacitance load. 5th overtone crystals designed to operate at series resonance. (Write for recommended circuits.)

Crystals are guaranteed only when operated under the conditions specified or in circuits recommended by International Crystal.

Drive Level: Recommended — Maximum 5 milliwatts for overtones. See chart for fundamental:

Condition of Operation: 32 mmf



Maximum Recommended Power Dissipation
in Crystal Unit

ONE DAY PROCESSING FA-5 and FA-9 1500 KC to 90 MC

Wire mounted, plated crystals for use by amateurs and experimenters where tolerances of .01% are permissible and wide range temperatures are not encountered.

PRICES FA-9* (Pin Diameter .093)* FA-5 (Pin Diameter .050)

Pin Spacing .486 (*FA-9 fits same socket as FT-243)

FREQUENCY RANGE	TOLERANCE	PRICE
Fundamental Crystals		
1,500—1,799 KC	.01%	\$4.50
1,800—1,999 KC	.01%	\$3.90
2,000—9,999 KC	.01%	\$2.80
10,000—15,000 KC	.01%	\$3.90
Overtone Crystals		
(For 3rd Overtone Operation)		
15 MC—29.99 MC	.01%	\$2.80
30 MC—54 MC	.01%	\$3.90
(For 5th Overtone Operation)		
55 MC—75 MC	.01%	\$4.50
76 MC—90 MC	.01%	\$6.50

HOW TO ORDER—In order to give the fastest possible service, crystals are sold direct and are not handled by any jobber. Where cash accompanies the order, International will prepay the Airmail postage. Otherwise, shipment will be made C.O.D. Specify your exact frequency and the crystal will be calibrated to .01% or better of this frequency with the unit operating into a 32 mmf load capacitance.



ONE DAY PROCESSING

Orders for less than five crystals will be processed and shipped in one day. Orders received on Monday through Thursday will be shipped the day following receipt of order. Orders received on Friday will be shipped the following Monday.

ONE DAY
SERVICE

Q
U
A
R
T
Z
C
R
Y
S
T
A
L
S

ONE DAY
SERVICE

International CRYSTAL Mfg. Co., Inc.

18 N. Lee Phone FO 5-1165
OKLAHOMA CITY, OKLA.

Tecraft



TUBE LINE UP

6AU6 osc.
5763 Mult./amp.
6360 Mult./amp.
6360 final amp.
12AX7 speech amp.
and driver
2-6AQ5 Modulators

Pwr. Imp., to final
20 Watts
EFFECTIVE
PWR. OUT.

10.8 watts **\$59.95**

TECRAFT TRANSMITTERS

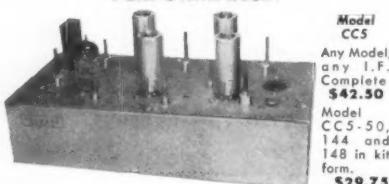
For 220, 144, 50 mc.

These Tecraft transmitters employ Hi-level plate modulation, use a hi-impedance mike, have provisions for metering all stages, tuned antenna output system to 52/72 ohm line and have an RF output indicator. Require 6.3 vac @ 4 amps and 250 vdc @ 250 ma.

Comes complete
with tubes, crys-
tal, plugs

\$59.95

FOR THE ULTIMATE IN PERFORMANCE!



Model CC5

Any Model,
any I.F.
Complete
\$42.50

Model

CC5-5.0,
144 and
148 in kit
form
\$29.75

CC5-5.0.....	50-54 Mc.
CC5-120.....	CAP intercom.
CC5-144.....	144-148 Mc.
CC5-148.....	CAP intercom.
CC5-220.....	220-225 Mc.

Choose I.F. frequency—6-10, 7-11, 8-12, 10-14, 12-16, 14-18 or for COLLINS, 26-30 Mc. Model CC5-220 with I.F. 14 to 19 Mc. only. This is a Cascade model—4db noise figure. (144 Mc) Tube line up: 6BZ7, 2 6CB6, 2 616.

THE MINI-VERTER

A natural for MOBILE use. Designed to use the broadcast band of any radio for tuning. Compact, to tuck away anywhere. For 15 or 10-11 meters... **\$23.95**
For 6 meters..... **\$25.95**
Tubes, crystal, power and antenna plugs included with all models.

Other I.F. frequencies on special order.

Matching 5-Element Beam \$7.45

SWR Bridge..... \$8.95

THE EQUIPMENT CRAFTERS INC.

523 Winne Ave., River Edge, N.J.

COLfax 2-0159

on the air. Ex-6EAP lives in Arlington, Mass. The Brain-tree Club's General Class license school is going well with WN1s GLW and GTX as new members. CTR is busy at work. Hingham hams attended a zoning meeting about YKD's tower and it was decided in his favor. WN1HDK is new in Swampscott and has an Adventurer and an SX-99 on 40 and 80 meters. CAM is working on a modulator for the AT-1 transmitter. New officers of the Satuit Amateur Radio Club are LCK, pres.; YTA, vice-pres.; ZUC, secy-treas. OEX spoke about the NC-300 receiver. The Quannapowitt Radio Assn. had Phil Rand, DBM, at its meeting. BYB has a Gonet on 6 meters. The South Shore Club held a meeting. Radio Amateur Open House held two meetings and CFW and BL spoke. BPW worked a VK on 80 meters with 20 watts. BGW has an autostart RTTY circuit with FGL on 2 meters. CUW is fixing up his house. LM is bothered with arthritis in his hands. ABJ has a BC-610B transmitter and three-element beam. BB is busy with the 160-meter DX tests. DFY is working 10-meter mobile with his dad and will have a three-element beam at home. SMO is on 40 and 80-meter c.w. with some 10-meter mobile. Stoughton is going to be the headquarters of Sector 1-B, which is made up of 21 towns, and Mr. Keating, our director, has his office in the Town Hall. New officers of the El-Ray Radio Club are JSM, pres.; JYC, vice-pres.; TSN, treas.; AAC, act. mng.; WUP, secy.; TTS, chief eng. Traffic: (Nov.) K1USA 810, W1EMG 402, UKO 236, EPE 160, AUVY 79, BOA 54, BPW 49, IBS 38, BGW 15, VTT 15, NUP 14, CUW 13, LM 12, ABJ 11, TY 11, BL 10, ALP 8, HWE 7, ZNQ 7, DFY 6, BY 5, SMO 3, ATX 2, LLY 1. (Oct.)

WESTERN MASSACHUSETTS — SCM, Osborne R. McKenaghan, W1HRV — SEC; RRX, RM; BVR, PAM; QWJ. The WMCW Net meets on 3550 kc. Mon. through Sat. at 1900 EST. Net attendance is fair. Some of the younger members are away at school so the net could use support from some of the old-timers. The HCRA Back Yard Net, on 29,580 kc. at 2100 EST Tue., is doing fine with good coverage and attendance from all over W. Mass. and into Connecticut and Vermont. New Novices are HIR in Chester and GZD in Fairview. AJV has a 10-meter beam atop a 40-ft. tower. QEA has his 20-meter beam going fine. W1GUD was heard doing a lot of brassbounding in the Novice bands. AJX took part in the SS from the RPI club station, 282. BYH has WAM and WAS just about mad. IYH is hunting DX again and picked up five new ones. KFV has his "countries worked" total up to 195 and is knocking them off steadily with his kw. and telrex beam. COI reports signals booming through on 15 meters and some nice contacts made with his rhombics. MNG reports hearing LIB working ZL2RZ on 10 meters at 6:30 one evening. THD has been appointed C.D. Radio Officer for East Longmeadow. ICY is moving to Canada. UUJ is Assistant EC in Pittsfield; also, RACES applications have been sent in for approval and the Pittsfield C.D. has purchased five Elmac units for the local net. UVI is active in c.d. work in Westfield. An ORS certificate was given to EOB; ORS and OPS endorsements to JYH; EC endorsements to LJQ, who is doing a fine job for Northampton C.D. The Sector 4A RO, KUL, expects sector radio units from the State any day now. RO HRV, of Easthampton, is placing an order for a town control station, as per c.d. plane. The Army Reserve Training Center in Springfield has a new amateur and MARS station. The call is K1WBX; the trustee W1WBX. Traffic: W1ZUU 125, BVR 52, TAY 36, DWA 25, AMI 22, MNG 18, BYH 5, HRY 5, JYH 2.

NEW HAMPSHIRE — SCM, Harold J. Preble, W1HS — SEC; BXU, RMs: CRW and COC; PAM: CDX. The Granite State Phone Net's new operating time is Tue. and Fri. from 1730 to 1830 and Sun. at 0900. The New Hampshire Slow-Speed Net is operating Mon. through Fri. at 1830 on 3685 kc. COC is NCS and would like to have more members. DVE is chasing DVA and WAS on 40-meter c.w. A radio club is being formed at Concord H.S. Those interested should contact DVE. It's good to hear GMH and LXN on the air again after their recent illnesses. PIA, the frog man, has moved to his new QTH and is the proud daddy of a "JL" born in November. WUJ has come off the air with rig trouble but hopes to take NCS for TCPN again soon. UNV is aboard the USS *Intrepid* in European waters. ASZ, with ARR as chief operator, is handling traffic for the University of N. H. BOF has been elected secretary of the Nashua M. & K. Club. YXA is back with Evans Radio. SSK is rebuilding his rigs and putting them in rack cabinets. When completed he should be on the air with a kw. Please check your certificates for expiration date and send them in. Traffic: (Nov.) W1HP 114, SAL 100, HOU 38, COC 27, ASZ 26, GMH 22, FZ 12, WBM 12, DVE 11, CDX 9, BYS 5, DYJ 5. (Oct.) W1IP 50, CDX 28, CCE 17, HOU 9.

(See New Hampshire Contest Announcement on page 92.)

VERMONT — SCM, Robert L. Scott, W1RNA — UGW left for the service Nov. 15th. Rutland ARC officers are WN1FKX, pres.; VTP, 1st vice-pres.; DES, 2nd vice-pres.; Henry Flagg, secy-treas. In Vermont, during the Sports Car 1200-mile Endurance Run of Nov. 24th, starting at N.Y.C., officials of the Association maintained a constant check on 57 cars, or the survivors after break-downs or

(Continued on page 92)

3 BANDER 20-15-10 Meters

1 Transmission Line

- 16 ft. boom
- 28 ft. elements
- 38 lbs.
- 52 ohm match
- 61 ST 6 aluminum elements

- 20 meter spacing
.15 and .1
- 15 meter spacing
.15 and .225
- 10 meter spacing
.3 and .2

Now work 3 bands with the Radio Specialties new 3 Bander. Most T.V. rotators can be used. Band switch in seconds.

Tune your transmitter and receiver to either 20, 15 or 10 meters and you are ready to operate.

Measured S.W.R.

(a) 14200 — 1.3:1
(b) 21300 — 1.4:1
(c) 28750 — 1.3:1

Measured front to back

(a) 14200 — 30 DB
(b) 21300 — 25 DB
(c) 28750 — 30 DB

Measured Forward gain
over Full Size
Reference Dipole

(a) 14200 — 7.8 DB
(b) 21300 — 7.9 DB
(c) 28750 — 8.1 DB

Radio Specialties
Swing-A-Boom permits
rotation of the boom
and elements in vertical
or horizontal planes so tuning
adjustments are made
possible from the
tower.

Convert Your Present 20 Meter Beam To A 3 Bander



Your present beam now can be modified to work on 20, 15 or 10 meters, with results equal to the 3 Bander. One transmission line is used. Complete set of coils, instructions and fittings supplied.

Write for catalogue F-1 for 3 Bander or Conversion Kit.

Also available the W 4 G L all driven beam for 20 meters. Write for catalogue 4 G L

FOR AS
LITTLE AS

39⁹⁵

- 2 element beam kit — \$39.95
- 3 element beam kit — 59.95
- 4 element beam kit — \$79.95
- 5 element beam kit — 99.95

RADIO SPECIALTIES INC.
354 SEVENTH AVENUE, BROOKLYN 15, N. Y.

modernize
your
portable/
mobile rig



M-4Z, M-5Z

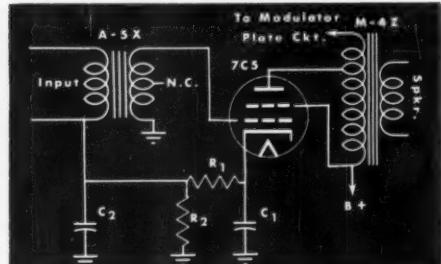
with
these
new

A-5X

TRIAD TRANSFORMERS

The TRIAD A-5x high gain microphone transformer eliminates need for audio amplifier with substantial savings in cost and space. TRIAD'S M-4z or M-5z eliminates over-modulation and boosts audio power. Both types are minimum size and low in price.

Type No.	List Price	Application	Primary Impedance Ohms	Turn Ratio	Wt. Lbs.
A-5X	\$4.15	Single button mike to p.p. grids—Hi-gain.	100	84	3/4
M-4Z	\$3.48	5000 (Autoformer).	6750	100 (total)	10
M-5Z	\$5.68	5000 (Autoformer).	6750	250 (total)	20



Write for Catalog TR-55D



4055 Redwood Ave. • Venice, Calif.



SEVENTH NEW HAMPSHIRE QSO PARTY

The Concord (N. H.) Brassbounders, W1OC, announce their sponsorship of the Seventh New Hampshire QSO Party, and cordially invite all interested radio amateurs to participate. Here are the details:

(1) Contest period: Saturday, February 18th, 6 p.m. EST, to Sunday, February 19th, 6 p.m. EST.

(2) No time limit and no power restrictions.

(3) Scoring: N. H. stations count 5 points for each N. H. contact, plus 1 point per outside contact; stations outside the state count 5 points per N. H. contact; both multiply by the number of counties worked (10 maximum).

(4) Engraved certificates will be issued to all participants reporting, with special endorsements for the highest-scoring stations, both in N. H. and outside, in the following categories: phone only, c.w. only, combined phone and c.w.

(5) The same station may be worked for additional credit on more than one band, phone or c.w. Suggested frequencies to congregate near are as follows: 1810, 3550, 3685, 3915, 7200, 14,100, 14,250, 27,000, 28,100, 28,800 kc.; 51,145 and 221 Mc. (Suggested time schedule for the above frequencies will be mailed upon request.)

(6) General call: "CQ NH" on c.w.; "CQ NH QSO Party" on phone.

(7) Contact information required: Report and QTH (including county of N. H. stations). Logs and scores must be postmarked not later than March 12, 1956, and should be mailed to the Concord Brassbounders, Box 312, Concord, N. H.

(8) The WNH (Worked New Hampshire) certificate will be awarded to stations working all ten counties during this QSO Party, participating logs confirming.

disqualifications, with communications provided by amateur mobile and fixed/portable stations. KOO/I operated as control at the summit of Mt. Mansfield, with KIWBL as operator. Other stations, fixed and mobile, operating were QNM, TLI, WPK, VSA, CML, KJG, NLO, RPR, DAP, DBF, K2s HJC, HJC/M, HJD, BIH, DHA, and ECW. The Lincoln Gap and Smugglers' Notch roads were the toughest mountain climbs they could find. The Grand Prize was an expense-paid trip to Europe and the winner will enter the Alpine Contest to be held next July. Traffic: W1OAK 151, AVP 42, BPF 48, UEQ 48, UGW 34, IT 33, RNA 18, ZNM 14, VMC 6, KJG 1.

NORTHWESTERN DIVISION

ALASKA — SCM, Dave A. Fulton, KL7AGU — A group of amateurs in Palmer, Alaska, have formed a ham club with about eighteen members, all Novices. They meet on Tue. evenings in the CO-OP Building. They are in need of technical assistance. Anyone interested is asked to contact WL7BMB, at Palmer. Another amateur radio club has been formed in the Anchorage Area at the high school. This club is composed of high school students, who meet at the high school on Thurs. after school. They are in need of both code and technical assistance. Anyone able to help here should contact BKN, ANO and AEQ are going to start a theory course for the YLRL. Ten-meter openings have been good the last few months with the 10-meter signals being the best since 1951. UM is getting ready to give the DX a go again after building a new kw. Also NT should be on with a kw, soon.

IDAHO — SCM Alan K. Ross, W7IWU — Smelterville: WHZ checks into the Montana, FARM, and WARTS Nets and reports that RQG, of Kellogg, has a new sideband rig on the air. Lewiston: GMC and HDP report on Halloween activities with a nice write-up in the Tribune. Those taking part were GMC, HDP, KKY, NOG, YBV, UJA, and IDZ Rarie: LQU is working out FB on 10 meters. Moscow: A new OPS is VQC, who reports there are about 16 active amateurs in Moscow. I hope you fellows can form a club and send me a recommendation for an Emergency Coordinator. Those interested in RACES should write to Dean Mayes, MKS, Box 486, Meridian, for application forms. Both the phone and c.w. RACES nets should be in operation by the time you read this. Please, all ORS, OPS, ORS, ECS, etc., resolve to report each month during 1956. Just a few minutes of it is all it takes and surely is appreciated by your SCM. Traffic: W7GMC 211, WHZ 12.

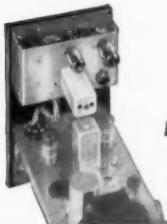
MONTANA — SCM, Leslie E. Crouter, W7CT — The Yellowstone Radio Club in Billings is conducting code classes on 3655 kc. Mon., Wed., and Fri. with PXR, VDZ, and YHS alternating on the chopper. Speeds from 5 to 15 w.p.m. are being sent. YZQ and KGF are starting a class in

(Continued on page 94)

NEW MULTIPHASE "Q" MULTIPLIER

- Peaks Desired Fone or CW Signal
- Nulls Out Interfering Carrier up to 50 DB.
- No Loss in Speech Intelligibility

- No Insertion Loss — New Two Tube Circuit
- Special High "Q" Pot Core Inductor



MODEL
AQ



MODEL DQ



MODEL
B
SLICER

CONVERTS MODEL A SLICER

Plugs into Model A accessory socket, converting it into a Model B. New front panel and controls provided. Enjoy all the advantages of "Q" Multiplier selectivity on CW, AM & SSB with your present Model A Slicer.

Wired.....\$29.50
Kit.....\$22.50

FOR AM, CW, SSB OPS

Desk Model "Q" Multiplier for use with any receiver having 450 to 500 KC IF. In attractive, compact case with connecting power-IF cable. Power supplied by receiver. Also provides added selectivity and BFO for mobile SSB or CW reception.

Wired.....\$29.50
Kit.....\$22.50

BUILT-IN "Q" MULTIPLIER

Upper or lower sideband reception of SSB, AM, PM & CW. For use with any receiver having 450-500 KC IF.

Wired.....\$99.50
Kit.....\$69.50

MODEL A SLICER

Same as Model B but less "Q" Multiplier

Wired.....\$74.50
Kit.....\$49.50

A NEW CONCEPT IN LINEARS



- Single 813 in Class AB₂. Approx. 2 watts effective or 4 watts peak drive for 500 watts DC input.
- New band-pass couplers provide high linear efficiency: 60-65%.
- Designed for 50-70 ohm coaxial input and output.
- Built-in power supply. Bias and screen regulation. Automatic relay protection.
- Exclusive metering circuit reads grid current,

MULTIPHASE 600L BROAD BAND LINEAR AMPLIFIER NO TUNING CONTROLS! SINGLE KNOB BANDSWITCHING 10-160 METERS

watts input, RF output, reflected power from mismatched load — switch to any position while on the air!

- Completely shielded — TVI suppressed. Free of parasites! Low intermodulation distortion.
- Choice of grey table model (17 $\frac{1}{8}$ "W, 8 $\frac{3}{4}$ "H, 13"D) or grey or black rack model.

Wired, with tubes.....\$349.50



MODEL 20A

- 20 Watts P.E.P. Output SSB, AM, PM and CW
- Bandswitched 160 — 10 Meters
- Magic Eye Carrier Null and Peak Modulation Indicator

Choice of grey table model, grey or black wrinkle finish rack model.
Wired and tested.....\$249.50
Complete kit.....\$199.50

MULTIPHASE EXCITERS

Check These Features

NOW IN BOTH MODELS

- Perfected Voice-Controlled Break-in on SSB, AM, PM.
- Upper or Lower Sideband at the flip of a switch, with 40 DB. suppression.
- New Carrier Level Control. Insert any amount of carrier without disturbing carrier suppression adjustments.
- Talk yourself on frequency.
- Calibrate signal level adjustable from zero to full output.
- New AF Input Jack. For oscillator or phone patch.
- CW Break-in Operation.
- Accessory Power Socket.



MODEL 10B

- 10 Watts P.E.P. Output SSB, AM, PM and CW.

- Multiband Operation using plug-in coils.

Choice of grey table model, grey or black wrinkle finish rack model. With coils for one band.
Wired and tested.....\$179.50
Complete kit.....\$129.50

WRITE FOR
LITERATURE ON
THE COMPLETE
MULTIPHASE LINE

MULTIPHASE
EQUIPMENT

Central Electronics, Inc.

1247 W. Belmont Ave.

Chicago 13, Illinois

PENTA



PINT-SIZED POWERHOUSE!

Here is Penta's new PL-6549 beam pentode, a compact power package which is daily finding new applications where reliability, high efficiency at low and medium voltages, low driving power, and excellent linearity are required.

For r-f output of 50 to 250 watts, or audio output up to 325 watts, the PL-6549 outclasses all other transmitting-type tubes. The beam pentode construction improves linearity—provides distortion-free high peak power output in audio or linear r-f amplifier service.

RATINGS

Filament—Thoriated Tungsten (quick heating)	
Voltage	6.0 volts
Current	3.5 amps
Plate Voltage, Max.	2000 volts
Plate Current, Max.	150 ma.
Screen Voltage, Max.	600 volts
Plate Dissipation, Max.	75 watts

A four-page technical data sheet giving suggested operating conditions and application information is available. Ask for data file No. 901.



PENTA LABORATORIES, INC.
312 NORTH NOPAL STREET
SANTA BARBARA, CALIF.

theory. If interested, call Pete or Ted for further information. YZQ has invited the club to meet at KBMY's transmitter. Ted will conduct a descriptive tour of the station and also will furnish the eats. The meeting will feature a talk on Geophysical Electronics given by PXR, whose job is in this field. AZO is a new amateur located at Yaak Air Force Base, Mont. A word of explanation regarding reports: Sometimes reports arrive too late to be mailed. Many reports are not usable because by the time the news gets into *QST* it is months old. Sometimes there are no reports at all and sometimes there are more than can be gotten in Montana's allocated space. Please help your new SCM and get your reports in early. KGJ is helping CT by writing the reports until CT is settled in his new home in Helena.

OREGON — SCM, Edward F. Conyngham, W7ESJ — The Oregonian Amateur Radio Society (Portland) has 129 members. A new and improved code and theory class is given once per week at Benton High School and Gresham Union High, helping prospective hams and those going for higher class tickets. The student turnout averages 40 per week. Those teaching are LFJ and DNB, theory; VGI, code machine; with JCJ, pres.; and VGI, vice-pres. PGB is conducting code practice from Eugene on 160, while SME does the same on 2 meters. EJ is working for a better mobile antenna system. AQK made 31 net checkins in November. UJ was down with pneumonia but is up and going now. WGB also is back from hospitalization. BVH was away from home in November. OMO is building frequency measuring equipment to go with his new OO ticket. BLN keeps busy as net mgr. for OFN and as EC for Coos Bay. UJL is watching the piggy bank to see if there is enough for a new DX-100. QKU is NCing NTN every Mon. night. QYS is a new ARRL member. PRA holds weekly code classes and is active on 2 meters. MKA has a new DX-100. New and renewed AREC members are EUG, OKM, TLQ, VPF, QYS, and SME. KAB sold some equipment and is shopping for a new receiver. WAT expects to move soon. SEZ and RET are building and assisting others on 2 meters. The Willamette Valley DX Club was formed in November, with HNG, pres.; GBW, vice-pres.; AC, secy-treas.; DJY and GHG, directors; MVC, photographer; QON, editor; ASG, DAA, DJY, ENW, FB, FMX, GJ, HQC, NKW, TML, and UAB, members. WKA is looking into more accurate frequency measuring systems. AJN moved into a new house. Traffic: W7QKU 286, HDN 66, OMO 34, PRA 30, BLN 26, TIR 20, AQK 11, BVH 8.

WASHINGTON — SCM, Victor S. Gish, W7FIX — On the day of the jet disaster at Eielson AFB near Fairbanks, Alaska, BA received a phone call from DET (engineer at KOMO in Seattle) asking if he could get through to Fairbanks as the phone calls were delayed six hours. At the time BA was working KL7FAF, handling traffic from the base, but he took time out to patch the news editor of KOMO through to Major Orr, public relations officer at Eielson AFB, and the tape made was used on several broadcasts from KOMO. WHX reports from the Apple City Radio Club as follows: PNN cleaned out his shack and auctioned gear for the club treasury with \$18 the result; MP has a new SX-100; WN7ZCK is on 2 meters; OVE is putting up a new 10-meter beam; and ETO is working on his beam rotator. Those making BPL this month were PGY, BA, VAZ, FRU, WOK, and AHV, the latter two on origination. OE is busy building a traffic man's dream—six frequencies on two bands with instant resonant shift without tuning. FWD reports that FWR is back from the hospital. LVB is crowding over his new grandson. APS claims he can't hear anything but DX these nights. NYJ QN1ed WSN 100 per cent in November. The WARTS (3970 kc, 1730 PST Mon.-Sat.) has changed its time because of skip. The NTN (3920 kc, 0630 PST Mon.-Sat.) is going strong but still needs Southern Idaho and Utah check-ins. AMC reports that he now has a 2½-kw. alternator for emergencies. FZB made 109 contacts with 35 sections in the SS for 9494 points. YJE reports openings to the south on 6 meters. TIQ is revamping the rig for the new MARS frequencies. UIN is trafficking on WARTS and NTN and also is trying WSN and RN7. RDR hopes to be more active from Ocean Park. Traffic: (Nov.) W7PGY 1017, BA 1006, VAZ 638, FRU 510, OE 255, WOK 181, KZ 165, AHV 138, EHH 55, WQD 55, UIN 54, USO 46, FWD 32, K7WAT 31, W7AIB 22, LVB 21, APS 19, NYJ 15, AMC 10, FZB 8, GAT 7, YJE 4. (Oct.) W7KZ 91, UIN 78, NYJ 55, K6BDF 7/24, W7RDR 10.

PACIFIC DIVISION

HAWAII — SCM, Samuel H. Lewbel, KH6AED — The Honolulu Amateur Radio Club elected the following officers for 1956: AKE, pres.; AVH, vice-pres.; OS, secy.; AGH, treas.; KC, asst. treas.; ZP and AFG, directors. The Honolulu Mobile Club started a trophy contest Jan. 1st. The first to turn in QSLs for WAS on a mobile rig will win the beautiful trophy donated by KC (Takemoto). Check with the club officers for the rules. W2UK received his KH6 call; watch for UK on 2 meters from Kahuku. ZD has been on 40 and 2 meters with his RTTY gear. AED still is wiring up his printer and looking for a transmitter-distributor. Traffic: KH6AJF 1228, KH6QU 516.

(Continued on page 96)

HOW MUCH SHOULD YOU PAY FOR A GOOD ROTARY BEAM?

Only Two Ways To Judge!
Don't Guess! Don't Be Fooled!

The only true gauges of beam value are (1) performance, which only a **full-size** beam can give and (2) the amount of aluminum per dollar cost!

And that's why the GOTHAM ROTARY BEAM cannot be matched for value by any beam on the market today. Gotham gives you **FULL SIZE BEAMS** made (except for the polystyrene insulator) entirely of new, rustless, first-quality mill stock aluminum—and **more of it**, in both length and thickness. You'll find no link coupling, no complicated mounts, no tuning stubs. No flimsy wire, no wood to rot or weather-proof. Easy assembly, simple matching of line to antenna.

YOUR GOTHAM BEAM ACTS AS AN AMPLIFIER:

A two-element GOTHAM beam will multiply your power by four; a three-element GOTHAM beam will multiply your power by seven. In addition, GOTHAM beams cut down QRM and noise. And a GOTHAM beam will give your receiver the same gain it gives your transmitter.

Remember: Your GOTHAM beam can greatly improve the performance of the most inexpensive receiver and low-power transmitter! Get a GOTHAM beam and work the world!

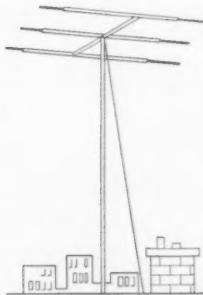
PROVED BY THOUSANDS OF USERS THE WORLD OVER!

HOW TO ORDER:

Send coupon with check or money-order direct to Gotham or visit your local distributor. Immediate shipments via Railway Express, charges collect; foreign shipments sent cheapest way.

Order from
these and
most other
good
distributors

Alabama: Curle Radio Supply, 406 Meridian St., Huntsville.
Arizona: Kennedy Radio, 4511 N. 8th St., Phoenix.
California: Offenbacher & Reimus Co., 1569 Market Street, San Francisco.
D. C.: Capital Radio Wholesalers, Inc., 2120 N. 14th St., N.W., Wash.
Florida: Kinkaid Radio Supply, Inc., 402 W. Fortune St., Tampa.
Georgia: Southland Distributor Co., 1641 15th St., Augusta.
Illinois: Atromic Corp., 6566 Sheridan Rd., Chicago.
Indiana: Graham Electronics Supply, 102 S. Penn St., Indianapolis.
Iowa: Ken-Ez Radio Supply, 501 First Ave. North, Ft. Dodge.
Iowa: Radio Trade Supply Co., 1224 Grand Ave., Des Moines.
Iowa: World Radio Labs, 3415 W. Broadway, Council Bluffs.
Kentucky: Hobie's Radio & Video, 119 Crab Orchard St., Somerset.
Kentucky: Universal Radio, 533 S. 7th St., Louisville.
Louisiana: Radio Parts, Inc., 807 Howard Ave., New Orleans.
Michigan: M. N. Duffy & Co., 2040 Grand River, Detroit.
Michigan: Northwest Radio, 435 Tamrock St., Lourim.
Michigan: Purchase Radio Supply, 605 Church St., Ann Arbor.
Minnesota: Lew Bone Co., 67 Smith 12th St., Minneapolis.
Mississippi: Swan Distr. Co., 342 No. Gallatin St., Jackson.
Missouri: Henry Radio, Butler.
New Hampshire: Evans Radio, Concord.
New Jersey: General Radio Supply Co., 600 Penn St., Camden.
New Jersey: Hudson Radio & TV, 35 Main St., Newark.
New Jersey: Radio Electric Service, 513 Cooper St., Camden.
New York: Hudson Radio & TV, all New York City stores.
New York: M. Schwartz & Son, 710 Broadway, Schenectady.
No. Carolina: Allied Electronics, 411 Hillsboro St., Raleigh.
No. Carolina: Electric Supply Co., P.O. Box 730, Wilson.
No. Carolina: Johmanns Electric Co., Inc., 312 N. Eugene St., Greensboro.
No. Dakota: Fargo Radio Service, 515 Third Ave., North, Fargo.
Ohio: Myronic Company, 2145 Florence Ave., Cincinnati.
Ohio: Electronic Supplies, Inc., 1320 Madison Ave., Toledo.
Ohio: Srepco, Inc., 133 E. 2nd St., Dayton.
Pennsylvania: George D. Barbee Co., Inc., 622 Columbia Ave., Lancaster.
Pennsylvania: Radio Electric Service Co., 7th & Arch Sts., Philadelphia.
Pennsylvania: Warren Radio Inc., 1313 Peach St., Erie.
Rhode Island: W. H. Edwards Co., Inc., 94-96 Broadway, Providence.
S. Dakota: Burghardt Radio Supply, Inc., Watertown, Aberdeen.
Tennessee: Curle Radio Supply, 439 Broad St., Chattanooga.
Texas: Gib's Ham Gear, 1118 Bellair St., Amarillo.
Texas: Nevees Radio Supply, 720 N. Stanton St., El Paso.
Virginia: Radio Equipment Co., 819 W. 21st St., Norfolk.
Virginia: Radio Supply Co., 3302 West Broad St., Richmond.
Washington: C. & G Radio Supply Co., 2502 Jefferson Ave., Tacoma.
Washington: Western Electronics Supply, 717 Dexter Ave., Seattle.
Wisconsin: A & F Electro Mart, 7833 West Greenfield Ave., Milwaukee.
Wisconsin: Harris Radio Corp., 289 No. Main St., Fond du Lac.
Canada: Louis Desrochers, P.O. Box 688, Amos, Quebec.



**This Full Size
Gotham Cost
Only \$21.95
And Brought
In 87 Foreign
Countries,
All Continents
And 30 Zones
On 35 Watts!**

**MAIL THIS COUPON TODAY!
10-DAY MONEY BACK GUARANTEE**

GOTHAM HOBBY CORPORATION 107 E. 126th ST. NEW YORK 35, N. Y.

Enclosed find check or money-order for:

<input type="checkbox"/> 2 METER BEAMS	Deluxe 6-Element	\$9.95	<input type="checkbox"/> 12-El \$16.95
<input type="checkbox"/> 6 METER BEAMS	Std. 3-El Gamma match	12.95	<input type="checkbox"/> T match 14.95
	Deluxe 3-El Gamma match	21.95	<input type="checkbox"/> T match 24.95
	Std. 4-El Gamma match	16.95	<input type="checkbox"/> T match 19.95
	Deluxe 4-El Gamma match	25.95	<input type="checkbox"/> T match 28.95
<input type="checkbox"/> 10 METER BEAMS	Std. 2-El Gamma match	11.95	<input type="checkbox"/> T match 14.95
	Deluxe 2-El Gamma match	18.95	<input type="checkbox"/> T match 21.95
	Std. 3-El Gamma match	16.95	<input type="checkbox"/> T match 18.95
	Deluxe 3-El Gamma match	22.95	<input type="checkbox"/> T match 25.95
	Std. 4-El Gamma match	21.95	<input type="checkbox"/> T match 24.95
	Deluxe 4-El Gamma match	27.95	<input type="checkbox"/> T match 30.95
<input type="checkbox"/> 15 METER BEAMS	Std. 2-El Gamma match	19.95	<input type="checkbox"/> T match 22.95
	Deluxe 2-El Gamma match	29.95	<input type="checkbox"/> T match 32.95
	Std. 3-El Gamma match	26.95	<input type="checkbox"/> T match 29.95
	Deluxe 3-El Gamma match	36.95	<input type="checkbox"/> T match 39.95
<input type="checkbox"/> 20 METER BEAMS	Std. 2-El Gamma match	21.95	<input type="checkbox"/> T match 24.95
	Deluxe 2-El Gamma match	31.95	<input type="checkbox"/> T match 34.95
	Std. 3-El Gamma match	34.95	<input type="checkbox"/> T match 37.95
	Deluxe 3-El Gamma match	46.95	<input type="checkbox"/> T match 49.95
(Note: Gamma-match beams use 52 or 72 ohm coax. T-match beams use 300 ohm line.)			

NEW! RUGGEDIZED HI-GAIN 6, 10, 15 METER BEAMS

Each has a TWIN boom, extra heavy beam mount castings, extra hardware and everything needed. Guaranteed high gain, simple installation and all-weather resistant. For 52, 72 or 300 ohm transmission line. Specify which transmission line you will use.

<input type="checkbox"/> Beam #R6 (6 Meters, 4-El)	\$38.95
<input type="checkbox"/> Beam #R10 (10 Meters, 4-El)	40.95
<input type="checkbox"/> Beam #R15 (15 Meters, 3-El)	49.95

Name.....

Address.....

City..... Zone... State.....



**SAME HIGH QUALITY
NEW LOW PRICES!**

WARD COMMUNICATION ANTENNAS

**quality antennas for your
mobile application ..**

Ward high-quality, heavy-duty mobile antennas are completely reliable with an unsurpassed field record of service. Prices new, reduced as much as 20%.

◀ Antenna Masts

Highest grade stainless steel—17-7 P.H., 57" to 96" lengths. Model WCA-3B. Specify length.

Heavy-Duty Antenna Base
Any vertical position can be obtained from adjustable swivel ball design. Wrenches, ground and solder lugs included. Model WCA-3.



Heavy-Duty Spring
Bends 100° without damage. Heavy cadmium plating protects against rust and corrosion. Tightening wrenches supplied. Model WCA-3A.

NEW, Roof Top Antenna ▶
Mounts from outside in $3\frac{1}{8}$ " hole. Small but rugged. Includes 12-ft. RG-58A/U cable. Two models: WCA-250 for 2 meter band and WCA-251 for 420-450 mc.

Ward also manufactures disguise antennas and ground plane antennas. Ask your supplier for new catalog, or write us.



WARD

PRODUCTS CORPORATION

DIVISION OF THE GABRIEL CO.

1148 EUCLID AVENUE • CLEVELAND 15, OHIO

NEVADA — SCM, Ray T. Warner, W7JU — OYQ, former secretary of the Reno Club, now a permanent resident in Las Vegas, is quite active on 20 meters with 400 watts. UPS, now located at Wendover, Utah, near the Nevada-Utah line, has applied for MARS membership. Andy erected a three-element 20-meter beam and purchased a new NC-183D receiver. LHQ obtained the co-operation of the Asst. D.A. in Las Vegas in assisting the Southern Nevada Amateur Radio Club to prepare incorporation papers. IJST 7 and MRN are recent SNARC members. The Las Vegas gang has been holding numerous 10-meter hunts lately. 5AOF 7 is now 7BRX. VIU, of Winnemucca, was quite active in the SS. W7NYO also got in his licks. Chas. received his YLCC and has worked considerable DX recently. YEX is now on phone with an AT-1. There are now four hams in Gabbs, so NWU won't be so lonesome.

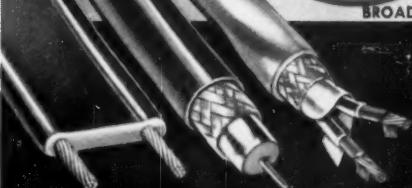
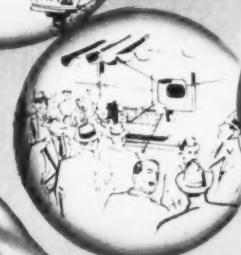
SANTA CLARA VALLEY — SCM, R. Paul Tibbs, W6WGQ — Asst. SCM; Roy E. Pinkham, 6BPT, SEC; NVO. At the November meeting of the SCCARA, the following new officers were elected: BPT, pres.; VZT, vice-pres.; WGO, secy.; KRF, treas.; APV, RNG, and HC, board members. CFB and EOA are the two directors remaining in office for one more year. At the Jordan Jr., High School in Palo Alto, a radio club has been formed with K6JTG as president and KN6OLB as vice-president. WLI took part in the recent F.M.T. K6BAM built a Q-Multiplier and needs Maine, New Hampshire, and Vermont. EXX has started sending Official Bulletins on 9 meters. He has an exciter for 420 Mc. and is building a high-power final for 144 Mc. with a 4-65A. YHM is back handling traffic in full swing with the NCS job for PAN on Thru. K6HGV is a code practice station. KN6IEE, of Redwood City is awaiting her ticket to clear the "N" from her call. In the Palo Alto Area 6-meter mobiles are working with the 144-Mc. e.d. drills. NIV is NCS on 144 Mc. and K6IQY is NCS on 6 meters. LTT has completed a new Class AB2 linear amplifier which runs 150 watts. K6HGV drives a pair of 811s in that ZRJ is using a Pi-Net antenna coupler and new VFO. He has cleared up the TVI so is back on with his work as RN6 manager. VZT gave a talk on antenna and antenna matching networks at the SCCARA January meeting. HC is gearing off on his traffic work by working on the phone net. NX has moved into his new home. Traffic: W6YHM 322, K6GIB 173, W6BPT 63, ALT 56, K6DIX 34, W6HIC 32, ZRJ 10, K6JTG 1.

EAST BAY — SCM, Roger L. Wixson, W6FDJ — Asst. SCMs; Harry T. Cameron, 6RVC; and Oliver A. Nelson, jr., 6MXQ. PAM: LL, RMs: EFD, JOH, and IPW. SXK reports poor receiving conditions aboard the *Hawaiian Rancher* for the month of November. K6EPC is putting out a general directory for NCN. Ed has hopes that it will be bigger and better than ever. K6WAY reports they are swamped with traffic since they put up a few posters letting the civilian and military personnel know about their activities. YDI seems pleased that the 10-meter band is opening more regularly and that his DX-100 is doing such a FB job. Our recent visit to the Napa Valley Amateur Radio Assn. was most enjoyable. We had a chance to discuss TVI problems with them and give some account of our experiences here in Oakland. NDY, ERG, HTE, KZD, and KNE/KOI were nominated for office for the coming year. HUY and BYQ have done an FB job. We enjoyed our visit very much. The ACACIA had a fine dinner at the Trails End and discussed the programs for the future. The December meeting was another dinner meeting. Don Batten and Don Doughty provided the entertainment for the evening. The Oakland Radio Club had its Christmas Party and held an election of officers. ZSS, GK, DDT, CCQ, HEX, and UTX are running the show in "36." The following are active on 2-meter RTTY: ASJ, VPC, JZ, YM, BNB, and FZC. The frequency is 147.29 Mc. Other RTTY activity has been good on 40 and 80 meters. An RTTY breakfast was held late in November where lower shift operation was discussed. Some operating procedures were adopted, such as closer frequency operation and the use of double CR and LF. Your SCM sure could use a few more activity reports. Traffic: K6WAY 552, EPC 51, W6ASJ 14, YDI 7.

SAN FRANCISCO — SCM, Walter A. Buckley, W6GGC. The San Francisco Naval Shipyard Club held its Nov. 4th meeting at the QTH of UOQ. 4Ls and XYLs were included in the invitation. The 29ers Club had ABK as the hidden transmitter control station for its monthly 10-meter hunt. AHH came in first with K6KFS trailing in last. One of the local magazine script writers joined the hunt and took pictures of the mobiles. Although not an amateur himself, Mr. Biddle is very interested in the work the amateurs do in civil defense and also in the fun the boys get through their radio hobby. The San Francisco Radio Club did not have a guest speaker but showed interesting movies at its last meeting. Installation of new officers also took place at the November meeting. Following on 6 meters in the HAMS (the Red Cross group) joined ranks at a luncheon in one of the Italian restaurants in Oakland with over fifty attending. The next monthly 6-meter luncheon will be held in San Mateo County. The fellows all decided that since there are so many interested hams on this band that hereafter a luncheon will be held once a month in one of the cities in the vicinity. In that way any

(Continued on page 98)

WIRE FOR EVERY ELECTRONIC PRODUCT



Belden

WIREMAKER FOR INDUSTRY

SINCE 1902

CHICAGO

3-8



C & G
FEATURES
THE
HALICRAFTERS
SR-500
Combination

W7MFG
 Cliff Osborne

MODEL HT-30
Transmitter/Exciter

VFO or xtal operation,
 VFO stability is .009%.
 Built-in voice control for
 effortless operation. AM, CW, or SSB at the flick of a
 switch on 80, 40, 20 and 10 meters. **\$495.00**



MODEL HT-31
Linear Amplifier

Continuous coverage from 3.5 Mc. to 30 Mc. Pi-net output from 50 to 600 ohms with no antenna tuner. Fully
 metered. Two 811-A's in parallel produce 500 watts
 input. TVI suppressed. **\$395.00**

MODEL SX-100
Receiver

Frequency range 538 kc-1580 kc,
 1720 kc-34 Mc.
 No images with dual conversion.
 Selectable upper or lower sideband for "round tables".
 TEE-NOTCH filter provides excellent rejection of unwanted signals. 100 kc. calibrator. **\$295.00**



The three units above can be combined into the professional SR-500 console to provide the ultimate in appearance and ease of operation. Write for descriptive literature on the SR-500 or any HALICRAFTERS products. Complete SR-500.

GET OUR TRADE-IN OFFER FIRST!
 Write for our USED EQUIPMENT Bulletin No. 210

C & G RADIO SUPPLY CO.

2502 JEFFERSON

Phone

TACOMA 2, WASH.

BR. 3181

TACOMA BREMERTON OLYMPIA
 CENTRALIA ABERDEEN

amateur interested in attending these luncheons could make the necessary arrangements to meet in his own nearby town or city and members of other clubs could join in the fun. Many of the local 29ers joined the group at the last luncheon. YLs and XYLs and all harmonies are welcome. The Young Ladies Club of San Francisco nominated officers at its November meeting and ballots have been mailed out to all the members. FEA spent Thanksgiving in her home town of Fresno. WJF is being kept pretty busy these days with commuting and trying to get up antennas so he can keep the rig on the air. QMO reports that USA is in a position to handle APOs, East Bound, Honolulu, and other traffic for the local nets. Operators are on duty at all times, seven days per week. Jeri is looking forward to the day shift soon so she can become active again ragchewing with the girls and fellows on different bands. We're very happy at USA as a civilian operator. GQA's OO report for November lists W7 and K9 calls but only one Novice listing for second harmonics. BYS and GGA took a trip over to the Oak Knoll Naval Hospital recently to visit SWP. We're sorry to report that although Pat's physical condition seems very good, he did not recognize either of his friends. It is very doubtful if he will ever be active on the MARS Net again. Pat was a faithful worker and had many friends locally. PHT and her harmonic, Karen, were in an automobile accident last week. The car was struck by another auto, and Cynthia was thrown to the street. Although no bones were broken, she was so badly bruised that she has to use crutches in order to get around. A hospital check-up showed that Karen was badly shaken up but had no serious injury. Please remember, gang, to plan to attend the AIRL National Convention to be held in San Francisco in July 1956. Traffic: W6FEA 48, GCC 28, QMO 26, WJF 7, GHI 6.

SACRAMENTO VALLEY — SCM, Harold L. Lucero, W6JDN — The Chico meeting was very nice with the Pacific Division Director and representatives from eleven towns present. S.sch. seemed to be the main topic, but League affairs also were discussed. The meeting ended with refreshments and all went on their way in a joyful mood. LLR gave a talk on c.d. and answered a number of questions. Thanks, fellows, for your support in electing me your vice-director. I'll do my best to do your bidding during my term of office. The RAMS, a mobile club, meets the 2nd Fri. of each month at Wm. Land Park Club House, in Sacramento, California. All interested in mobile are invited to attend. ILZ spent some time in Santa Cruz. Local traffic men are K6FAV, K6CNE, K6CNA, and K6ASX and they are doing a fine job. NCV M is doing nice work with new equipment. HIR has requested appointment as OO. JDN spent some time in San Francisco during the illness of his wife and visited MARS and the SCM of San Francisco and Rose, his XYL. As the c.d. program has been in a slump in Siskiyou Co., the local EC, K6IVD, is working on a plan to increase the AREC activity in this area. Let's be sure to give him a helping hand, gang. Traffic: K6ORT 202, W6CMU 163, ILZ 3.

SAN JOAQUIN VALLEY — SCM, Ralph Saroyan, W6JPU — The 2-meter repeater is working out very well. BUT, mobile in Taft, worked into the Bay Area and NTK worked into the Los Angeles Area. There seems to be no limit to what can be worked on the repeater. K6JQN is the call at C.D. Headquarters, Chandler Field, K6GTI, W6ONK, ZYR, UKB, SMS, and QOS assembled a DX-100 for Eileen, FKY. Lots of luck to you, Eileen. The Turlock and Modesto hams have converted ARC-4 equipment with good success. UJU is being heard back on 75-meter mobile. UKB is on all bands with an HT-30 rig. The Fresno Radio Club handled the Motorcycle Enduro Run in the Sierras with good success on 75 meters. Those present were KN6KLE, KN6LRU, W6DUD, JPU, K6GTL, W6ONK, UJU, UKB, JXY, OWL, GFV, BAN, and K6BGK. Richard Takakjian, a ham-to-be, fell out of a tree and broke his collar bone. That's the hard way, Richard! K6GHC is being heard on 75-meter s.s.b. BAN is now converted to Class B modulation on mobile. All Emergency Coordinators are requested to send in monthly reports to EBL. JPS is chasing DX on 20 meters. Please send in more news. See you next month! Traffic: W6ADB 108, EBL 23, SJJ 18.

ROANOKE DIVISION

NORTH CAROLINA — SCM, Charles H. Brydges, W4WXZ — SEC: ZG, RM: VHI, PAM: ONM, OOs: SOD and JZQ. Nets: Tarheel Net, 3865 kc.; Greensboro Two Meter Net, 15.88 Mc.; Charlotte C.D. Net, 3825 kc.; Skunk Ten Meter Net, 29,000 kc.; Tarheel Teen-age Net 3950 kc. The Greensboro Club station, GNF, is rebuilding the 3.8-Mc. rig. GNF also has a 144-Mc. rig and beam. 9QNR/4 is located at Roanoke Rapids. A very successful c.d. test evacuation was held in Charlotte on Nov. 9th. The Charlotte C.D. Net used BX/4 atop the 17-story Johnson Building as control station. Also used were mobiles AYA, BFJ, IBK, WDJ, HVK, CBP, CZR, and ZXK. BX 4 was manned by ZQB (EC), ZQA, WXZ, and K4BVQ. JZQ, NRN, and LCV have been posted on the civil defense committee for Elizabeth City. JZQ is Radio Officer. EZH now

(Continued on page 100)

YOU'RE THERE! with the most technically perfected communication arrays ever produced!



**Tuned,
Matched
and Calibrated!**

NO ADJUSTMENTS OR
EXPERIMENTATION OF
ANY KIND NECESSARY!

MODEL NO. 503A
ILLUSTRATED
AMATEUR NET \$136.20

YOU CAN BE SURE of optimum performance per element at your site with the highest S/N ratio, F/B ratio and minimum interference (TVI, BCI and QRM) pattern ever provided or available before.

NOW! 41 models to meet any requirement on the 2, 6, 10, 11, 15, 20 or 40 meter bands. Of minimum bulk, low wind drag design, with best quality materials for all-weather durability.

Completely integrated mechanically and electrically, precision machined and calibrated for easy assembly and duplication of our laboratory and field-checked specifications at your site!

	MODEL NO.	DESCRIPTION	PRICE	AMATEUR NET — F.O.B. ASBURY PARK, NEW JERSEY
40 METERS	420	2 element Super Mini-Beam Array	\$180.00	
	402	2 element Full Size Array	275.00	
	403	3 element Full Size Array	330.00	
20 METERS	503	3 element Full Size	120.00	
	503A	3 element w/loop ends Full Size Array	136.20	
	504A	4 element w/loop ends Full Size Array	185.00	
	505A	5 element w/loop ends Full Size Array	240.00	
	506A	6 element w/loop ends Full Size Array	280.00	
MINI-BEAMS AND SUPER MINI-BEAMS				
	520	2 element (coil) Mini-Beam	55.50	
	520B	2 element (with balun) Super Mini-Beam	62.50	
	530B	3 element (with balun) Super Mini-Beam	92.00	
15 METERS	153A	3 element w/loop ends Full Size Array	110.00	
	155A	5 element w/loop ends Full Size Array	210.00	
	156A	6 element w/loop ends Full Size Array	235.00	
SUPER MINI-BEAMS				
	1520B	2 element (with balun)	55.50	
	1530B	3 element (with balun)	82.00	
10 METERS	10M3A	3 element w/loop ends (with balun)	67.50	
	10M5A	5 element w/loop ends (with balun)	108.00	
	10M6A	6 element w/loop ends (with balun)	145.00	
6 METERS	6M-3C	3 element (with balun) Wide Spaced	14.50	
	6M-6C	6 element (with balun) Wide Spaced	57.50	
2 METERS	2M-3C	3 element — "Quick-rig"	5.95	
	2M-6C	6 element Wide Spaced Array 8'6" Boom	12.50	
	2M-8C	8 element Wide Spaced Array 13'9" Boom	13.75	
	2M-15C	15 element Wide Spaced Array 27'9" Boom	39.25	
1 1/4 METERS	(220 mc)	5 element	6.95	

WRITE FOR CATALOG

Mention models or bands in which you are interested. Prices and specifications subject to change without notice.



**ASBURY PARK 21
NEW JERSEY, U.S.A.**

Tel. Prospect 5-7252

CANADIAN DISTRIBUTOR
Delhi Metal Product, Ltd.
Delhi, Ontario

"BEAMED-POWER" ROTORIES FOR AMATEUR AND COMMERCIAL COMMUNICATIONS

ARROW... Equipment Headquarters for Hams!

ARROW's Own Pocket AC-DC VOM MULTITESTER 2,000 ohms-per-volt



Extremely accurate and sensitive. Single selector switch for all ranges. 3" rectangular meter with easy to read scale. 1% precision resistors; jeweled D'Arsonval microamp meter movement, completely plastic-shielded against magnetizing. Rugged metal case.

Ranges: AC-DC and output voltage: 0-5, 0-25, 0-100, 0-500, 0-1000 volts. DC current: 0-500 µA, 0-25 MA, 0-500 MA. Resistance: 0-20K ohms, 0-2 megohms. Decibels: 0-20 db to +16 db. Size: 3 1/2" x 5" x 1 1/2". Shipping weight 3 lbs. Complete with test lead and batteries.

Net Price \$11.95

TRANSITRON TR-1000



TR Switch

Automatic change-over from receiver to transmitter without coils, variable capacitors, or tuning adjustments. Peak power handling capacity of 1000 watts completely eliminates the difficulties encountered with heavy-duty antenna change-over relays. Range of 1.7 thru 32 megacycles. Insertion loss to receiver never exceeds one S-Unit.

Net Price \$9.95

ARROW's Own Pocket AC-DC VOM MULTITESTER 1,000 ohms-per-volt

Rugged and compact. Large, easy to read scale on full 3" rectangular meter. 1% precision resistors; jeweled D'Arsonval microamp meter movement. Ranges: AC-DC and output voltage: 0-10, 0-50, 0-250, 0-500, 0-1000 volts. DC current: 0-1, 0-250 MA. Resistance: 0-10K and 0-100K ohms. Size: 4 1/4" x 3 1/2" x 1 1/2". Complete with test lead and batteries.

Net Price \$7.75

All prices f.o.b. N.Y.C.

ARROW
ELECTRONICS INC

65 Cortlandt Street, N. Y. 7, N. Y.
Dlxby 9-4714

Arrow Hempstead - 215 Front Street
IVanhoe 1-1826

has a 510-ft. rhombic that works fine on 40, 20, and 10 meters. Bill also has a 300-watt r.f. deck for 2 meters. PEQ is working on antennas and exhausts with a Viking transmitter. PMO works 75 meters in the early morning. AIR works out with his 16 watts and MARS gear. WYA is working on radio and television antennas for the winter season. ZQA is working on a high-power rig. HUO has a new receiver and is working plenty of DX on 20 and 40 meters using a vertical. Traffic: W4RRH 38, FDP 18, EJP 14, GHS 8, W9QNR 4 6, W1ACY 2.

SOUTH CAROLINA — SCM, T. Hunter Wood, W4ANK — GLU sends a nice report of activities in Rock Hill and advises that the emergency set-up includes 8 mobiles, K4DFW, W4CXO, GQV, GLU, JCP, UFP, UMW and ZPB, GLU and ZPB being a father-and-son team. ERG has a new mobile rig. KIAVU is very active on all bands with a Harvey-Wells. UJK is active on 40 meters. VJI and HMG are on 2 meters in Columbia. GQE, IZD, and SWT are on 2 meters in Charleston. JHDR is handling a lot of traffic on phone. DYG is active on 75 and 10 meters. TSU has completed his kw. and should be heard soon. LXX and FGX are on 20-meter c.w. AUL is getting out well with his 500-watt. Route Manager AKC reports the following reported into SCN during November with times QNI indicated: AKC 22, ANK 12, KIAQD 2, CHD 16, KYN 11, 93BN 4 2, YAA 14, QCC 11, SOY 12, ITNO 4 2, K3AVU 11, SOF 6, RPV 6, DYP 13, UUB 1, KTI 1, AWY 6, UUD 1, ZRH 1, TTG 1, PED 2, HAP 6, UNO 1, and K4ERG 5. Fifty-nine messages were handled on the C.W. Net. K4CUB has left Charleston for KL7 country. WZOP is being transferred to Germany. ANK received a reported accuracy of 3 parts per million in the last Frequency Measurement Test. Traffic: (Nov.) W4HDR 124, AKC 121, FFI 117, ANK 105, ZIZ 74, YAA 20, DYP 12, FM 12. (Oct.) W4HDR 160.

VIRGINIA — SCM, John Carl Morgan, W4KX — SEC: RTV. Virginians again were well up in the forefront in the SS. KFC, in addition to making 1159 contacts in all 73 sections, reports a total of 2439 QSOs in October and November, including WAS and DXCC. IA missed only VE8, while JUJ failed to snag Utah. IA, who teethed on a coherer, finally is bucking for DXCC and has 81 confirmed of 115 worked. ZMC, back with a rock-crusher, is out for Vic's laurels. ZMI reports participating in his first SS in 10 years of hamming. BLR and CXQ snagged 30-w.p.m. stickers for their CP certificates. The Petersburg ARC put on an impulsive "get your license" drive, resulting in several new tickets by K4CE, CMIC, CDM, DEA, DWS, DVC, EMT, EFS, GEK, and GPW, as well as two teen-age YLs, K4NE, ECU and EUW. A new club has been organized at Wakefield High School with 15 members, including officers VOZ, K4AJA, and K4NBH. Eleven fellow hams helped OFR put up a wind-up tower, a most appropriate ham antenna support. LW, limited to oceanic hamming between sea trials, reports VOZ is reactivated with K4CDK as manager. Di-k also notes that a Virginia amateur, K4GFB, is communications officer for the Byrd Antarctic Expedition. BRI is catching up on hamming while recuperating from a month's rehab in the hospital. K1ASU has been chasing DX on 20 meters, but again made BPL the hard way. FPK is trying a new "do it yourself" 10-meter beam. TYC 3 still is a VN old faithful from Washington. It looks like old times to see SHJ's sizable traffic total. Sea duty limits Happy's air time. Traffic: WAPEC 944, SHJ 229, K4ASU 229, W4BLR 129, YZC 88, K1DBZ 81, W4CFV 43, FPK 38, YVG 36, FV 35, CCE 30, CZB 25, AAD 14, WBC 14, AQA 12, KFC 11, TYC 3 11, OFR 6, ZMI 4, APR 2.

WEST VIRGINIA — SCM, Albert H. Hix, W4PQQ — SEC: GEP, PAM: FGL and GCZ, RMs: DFC, GBE, HZA, and JWX. The son of PNR, who is JDW, is now in the Navy. PNR has a new kw. rig. If any of you want to see an antenna that stretches from mountain to mountain, go see PNR's layout. This section was well represented in the Sweepstakes. LSG has a kw. rig under construction. PQQ put up a three-element 10-meter beam and is finishing a kw. final for that band. UVR has been very active lately. BWK got a new car recently but still is active. BFG got his General Class ticket. KVO is operating portable at Greenbrier Military School. JBE has a new S-40A receiver. 4SPG and W4NDJQ visited the Princeton Club recently. PQQ visited 9VND and 9YFY while in Chicago. GCZ is planning a 15-meter beam. The Monroe Radio Club is a newly-formed club in this section. Members are W4SHNR, W4N8VM, TKT, TQB, W4N8BLH (an XYL), W4N8UJW (now away at school at V.P.I.), and W4N8AWD (an XYL). The address is c/o WSTQB, Box 203, Union, W. Va. for those who might like to join. W4N8DEY has an NC-300 on order. JWX will be getting married soon. NYH still is on the night shift but keeps up activity. Traffic: (Nov.) W4HZA 84, PZT 68, GBE 49, PJI 49, NYH 19, BWK 12, UYR 9, JWX 8, PQQ 4. (Oct.) W8GBF 68, JWX 54. (Sept.) W8GBF 28.

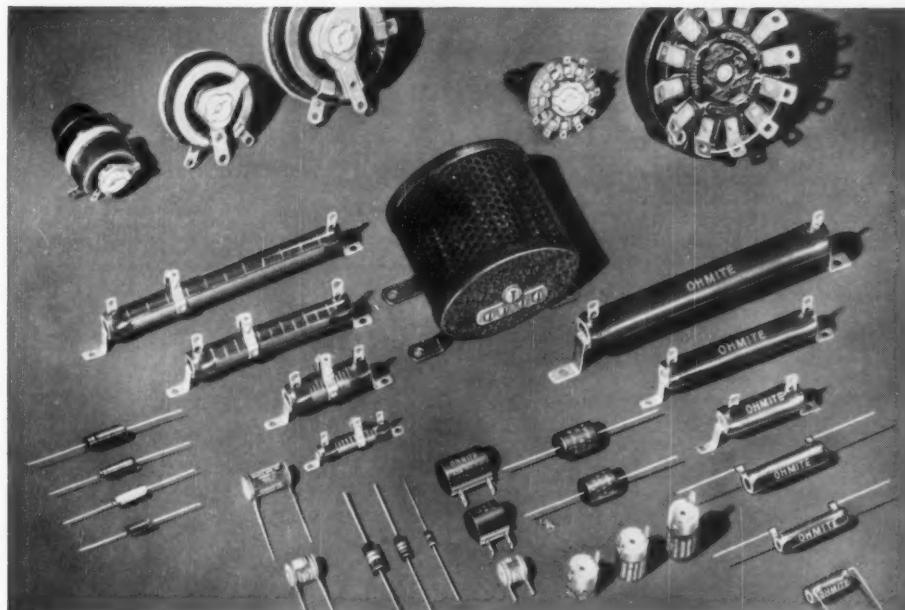
ROCKY MOUNTAIN DIVISION

COLORADO — Acting SCM, Carl L. Smith, W0BWJ — SEC: MMT, RMs: KQD and MYX. PAM: IUF. The newly-elected SCM for Colorado is James Simpson, HEM, (Continued on page 102)

For more hours on the air . . .

less on repair . . .

USE OHMITE[®] DEPENDABLE COMPONENTS



Your rig is sure to give more care-free hours if you are using Ohmite components. They provide an extra margin of safety. For example, Ohmite "Little Devil" composition resistors are rated at 70°C instead of the usual 40°C . . . Ohmite wire-wound resistors have *welded terminals* that give perfect, permanently stable electrical connections. For the utmost in dependable performance, select Ohmite components for your equipment.



Write for
Stock
Catalog

OHMITE
MANUFACTURING
COMPANY
3636 Howard St.
Skokie, Illinois
(Suburb of Chicago)

OHMITE[®] RHEOSTATS • RESISTORS • TAP SWITCHES

**Any resistance
you want**

— and any length shaft

Centralab

Adashift® Radiohms®

**12 basic shaft types available from
3/8" to 10" in length, including auto
types, insulating nylon, many others.**

Centralab's patented Adashift design gives you both control and shaft for no more than the cost of an ordinary control.

The basic Adashift control has a stub shaft you can use as is, as a short, screwdriver-slotted unit. Or you can easily attach any of 12 basic shafts. An instant, positive lock gives you a solid, well-aligned unit every time.

After adding the shaft you need, you can convert the unit to a switch type with Centralab "Fastatch" type KB line switches.

Your Centralab distributor has Adashift controls in the popular model "B," 15/16" construction. Order from him.

Send coupon for bulletin 42-199.



Adashift Kit

No. AB-100

An assortment of 39 most popular controls, switches, shafts, shaft extensions, and couplers. In hinged-lid plastic box. **\$22.30** suggested list price.

Tear out coupon and mail today!

Centralab

A Division of Globe-Union Inc.
912B E. Keefe Ave., Milwaukee 1, Wis.

Send me Centralab bulletin 42-199.

Name _____

Company _____

Address _____

City _____

Zone _____ State _____

B-3154A

825 South Weber St., Colorado Springs, Colo. Please send Jim all reports and letters concerning ARRL news and business. The Pueblo Radio Club bulletin has news of nine mobiles who participated in the Simulated Emergency Tests. BEZ is working on a kw. rig, and UNM has moved to Pueblo. MYX has been on vacation from K8WBB, returning in December. The net reporter for Colorado nets is TNK, of Cortez, IA has been studying unorthodox behavior of impedance bridges in his multi-band antenna coupler. TVI found some hard-to-locate troubles in his DX-100 and is going strong again. His stand-by Heath AT-1 was used to fill voids while the bugs were being corrected. Net activities show the CWN going strong with 292 stations reported in 20 sessions. HNN had 398 check-ins and handled 262 messages in 25 sessions. CSSN shows 70 reporting and handling 74 messages in 15 sessions. K9FAM is back on the air as one of the kingpins in net coverage for Colorado. BPL for November was made by W0WGB, K8WBB, and W0KQD. Traffic: (Nov.) W0WBB 1023, W0KQD 780, WGB 216, EVL 81, K9FAM 66, W0VNU 61, YMP 61, IA 44, AGU 39, BOP 28, DRY 25, QXM 24, TNK 18, TVB 16, NWJ 15, LNH 12, SGG 7, SKK 6, SWK 5, VPE 4. (Oct.) W0IA 50.

UTAH — SCM, Floyd L. Hinshaw, W7UTM — The Ogden Club election shows the following results: LQE, pres.; ABI, vice-pres.; NHQ, secy-treas.; and VHS and NAY, directors. Congratulations to all! ZNZ and the gang still are keeping 3935 kc. heated up every morning. QDJ is trying horizontal polarization on 2 meters, but finds it does not give the coverage that vertical polarization has given in the past. The UARC round table is meeting on 3735 kc. for Novices and on 3830 kc. for phone stations. Net control stations are on both frequencies nightly. Look on these frequencies for that Utah contact for WAS. The Utah CARS Net is scheduling an additional session Wed. on 3700 kc. to participate in Utah e.d. drills at 7:30 P.M. MST. Traffic: W7UTM 4.

SOUTHEASTERN DIVISION

ALABAMA — SCM, Joe A. Shannon, W4MI — SEC: TKL, RM: KIX, PAM: WOG. Congratulations to the following new appointees: RYY, ZSH, SNS, and RLG as ORS; KAOZ as OPS; HKK as OO Class I. Excellent scores were made in the last F.M.T. by HKK, YNG and FSA. OES appointments are going begging for lack of interest among the v.h.f. devotees. HKK recently was approved as State RACES Radio Officer. NZM scored 3750 points in the WW DX Contest. BMM is proudly displaying his first SP card! New officers of the North Alabama Hamfest Assn. are YXW, Pres.; BML, 1st vice-pres.; PKA, 2nd vice-pres.; DGN, secy.; YRO, treasurer. Club pres. GCV reports that the Club now has 30 members with 15 prospects attending code and theory classes. VDL is the new treas. of the Alabama Federation of the Blind. Welcome to KN4EWM, of Montgomery. She is 12 years old and is the daughter of EWM. Another newcomer to KN4CHQ in Anniston. K4ANB received General Class license and joined up with AENB. K4FDY reports there are five operators at the station. ZSQ is working on a 2-meter beam and has a new 10-meter beam on a 40-foot tower. He is the new manager of AFNP. JKU is sporting a new skywire and UK has a new shack! Traffic: (Nov.) W4UCH 718, K4FDY 556, W4YRO 101, KIX 96, RLG 67, ZSQ 63, WOG 62, ZSH 52, DTT 44, AVX 38, EVD 30, KAOZ 29, W4TKL 28, TXO 20, DGN 11, OAO 11, KAJK 8, WAEWB 5, K4BSV 3, W4PWS 2. (Oct.) W4HKK 100, NZM 16, BMM 8, WAZ 8, K4DSJ 4.

EASTERN FLORIDA — SCM, Arthur H. Benzees, W4FE — SEC: IYT, Ft. Lauderdale! New officers of BARC are BMR, pres.; AHZ, vice-pres.; LRM, secy.; EAV, treas.; FNR, act. mgr.; KNA4CVP, sgt. at arms. FJU made 273 contacts in 71 sections in the SS, Daytona Beach. The CD Radio Club has been formed with MSP in charge. DKY now is on 15 meters with a new Johnson. KNA4EK has just received his ticket. FSS spent several months "up north" but is back with us, Lake County. The following are now on 6 meters: ADB, IQJ, AVV, YAN, HZU, FE, and KAAJ. The local frequency for the County is 50.16 Mc. Ft. Myers: SMK is back, after two years with the Signal Corps, with a DX-100 and will resume at the U. of F. next semester. KFT is DXing on 15 meters. LX is on 20 meters with 500 watts and is copied consistently in Korea by SMK. Sorry to learn of the passing of HSSZ. New ECs are NQW for Monroe county, YJE for Dade, and FDK for Manatee. The So. Miami Radio Club meets the 1st and 3rd Fri. KQJ is president, DX-100s are in operation at BTM, LMG, and KAAHW. JO won DRO a WAS contact. AG is snagging more DX with the new 10-meter beam. K4ANW has a new SX-100. K4CEJ had dropped the "N." The XYL of IYT is now GGQ. General Class, AHW is working ZS and OQ5 stations with ground plane but will have a beam soon. Traffic: (Nov.) W4JU 524, WEO 238, WS 106, LAP 100, LMT 70, ZIR 54, FE 38, AHZ 30, YNM 27, BWR 26, RWM 25, PZT 22, IYT 19, KNA4EVV 15, W4FSS 12, WEM 11, EHW 10. (Oct.) W4ZEB 326, WEO 130, ELS 102, LAP 62, YJE 36, AZH 23, EHW 6. (Sept.) W4ELS 69, LAP 69.

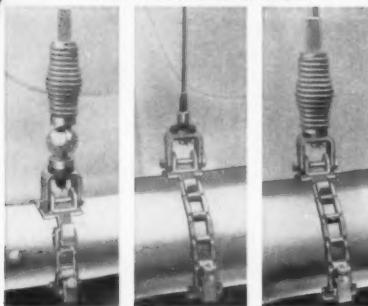
(Continued on page 104)

Master Mobile's

CAVALCADE OF NEW EQUIPMENT

with all new improved features!

BUMPER MOUNTS



No. 444 \$17.80

No. 445 \$7.95

No. 446 \$13.45

Adjustable to any bumper. No holes to drill, easy to attach. High-polished Chrome Plated $\frac{3}{8}$ "-.24 thread, to fit all antennas. Precision engineered.



MASTER MATCHER & FIELD STRENGTH METER

Automatically tunes the entire band from the drivers seat!

6 or 12 volt models \$24.95

GROUND PLANE (Drooping Type) FOR 6 METERS

No. MGP-6



Aluminum alloy tubing, coax cable connector. For medium or low powered trans.

\$14.95



No. 321 BODY MOUNT

Swivel base body mount, less spring. Specially constructed diagonal ball joint for maximum strength.

\$7.95

ANTENNA COILS

HY "Q" construction with wider spacing of turns for high frequency bands. Use as center or base loaded antenna with 60' whip.

No. 750—MASTER DELUXE ALLBANDER

- Covers 10 thru 75 and all intermediate frequencies.
- Silverplated single turn contact, positive spring.
- Eccentric cam contact, easy selection of turn.
- Automatic lock prevents damage to coil.

No. 775—MASTER
MULTIBANDER

- Covers all amateur bands 10 thru 75. Select band with slide contact switch to preset tabs.
- Seven silverplated contacts on heavy duty slide switch.
- Tabs easily set with Grid Dip Oscillator.
- Bandspreader BS-195 furnished with coil for 100KC QSY.



No. 750 Comp.
\$12.95

Size—Both—
2 $\frac{3}{8}$ " Dia x 13 $\frac{3}{4}$ " Long

No. BS-195 BAND SPREADER

[Variable Top-Hat]
Permits variation of 100 KC
Chrome plated stainless steel ... \$1.95



No. 825 MICRO-Z-MATCH

Micrometric Impedance Matching
Inductance for Mobile Antennas

Body mounts
sold separately
from \$8.75 up.



Complete with kit

\$7.95



Used on all bands with any type coax cable to match any mobile antenna. V.S.W.R. 1:1. Roller coil construction with rear cap rotating the inductance in case. 4 microinches max. ind. Infinite adjustment, positive setting.

Master Mobile Mounts, Inc.
1306 BOND STREET • LOS ANGELES 36, CALIFORNIA



AT LEADING
RADIO JOBBERS
EVERWHERE

A Message from



WARD, W2FEU

WANTED: 3000 HAMS!

We'll mail GE Ham News and RCA Ham Tips free for one year to the first 3000 hams who send us written requests. No need to buy anything. No strings attached. Just write Ward, W2FEU, and ask for Ham News and Ham Tips. Remember—offer limited to the first 3000 requests.

Before You
Buy or Trade
any Ham Gear
see WARD, W2FEU

Time Payments Arranged at Low Cost
Through Our Local Bank on Purchases
of \$100.00 Net and Over

ADIRONDACK RADIO SUPPLY

185-191 W. Main St., Amsterdam, N. Y.

Tel. Victor 2-8350

Ward J. Hinkle, Owner

WESTERN FLORIDA — SCM, Edward J. Collins, WAMS/RE — SEC: PLE, EC's: MFY and HIZ, CCY is looking for more audio now that he has r.f. AXD had a wonderful time in W-5-Land. BCG says 15 meters is the only band. GMS has a new s.s.b. exciter. PAA is going after DX QSL. KIAAH is enjoying low power. YES is getting s.s.b. fever. KIAKP is a traffic expert. HJA has moved to Milton. HKR has a new 14-Mc. beam. KN4ELC is working hard for General Class. KN4ECP has the Adventurer going. MUX is hot on 15 meters. UCY is doing a swell job on 10 meters. BFD is QRL "Porthole Radio." ZPN stays on 7 Mc. with VR. QR keeps tabs on the Hurricane Net. FHQ finds the silver swell on c.w. UUF is after more power on 141 Mc. KN4ATV is after General Class. ROM sold out. QU is threatening to get back on. UC still is getting parts for the game. KUDD is sporting a General Class ticket. FDL is with the C.A.A. at Pens. CQX is the spark plug at Crestview. CDE has a large time on 75 meters from Blountstown. ROX keeps Panama City on the map. MS is proud of his new 75A-1. DAO/DEF has been QRL the fish business. MEL was seen looking over parts in a local radio store. CLV is getting s.s.b. fever. GRO is QRL a harmonic. PQW is talking s.s.b. PLE would appreciate hearing from section members interested in emergency work. RZY has been checking in on the Dagwood Net as usual. EAR has cured TVL. KIAGM wants his sked to be s.s.b. Hi. Traffic: K4AKP 370.

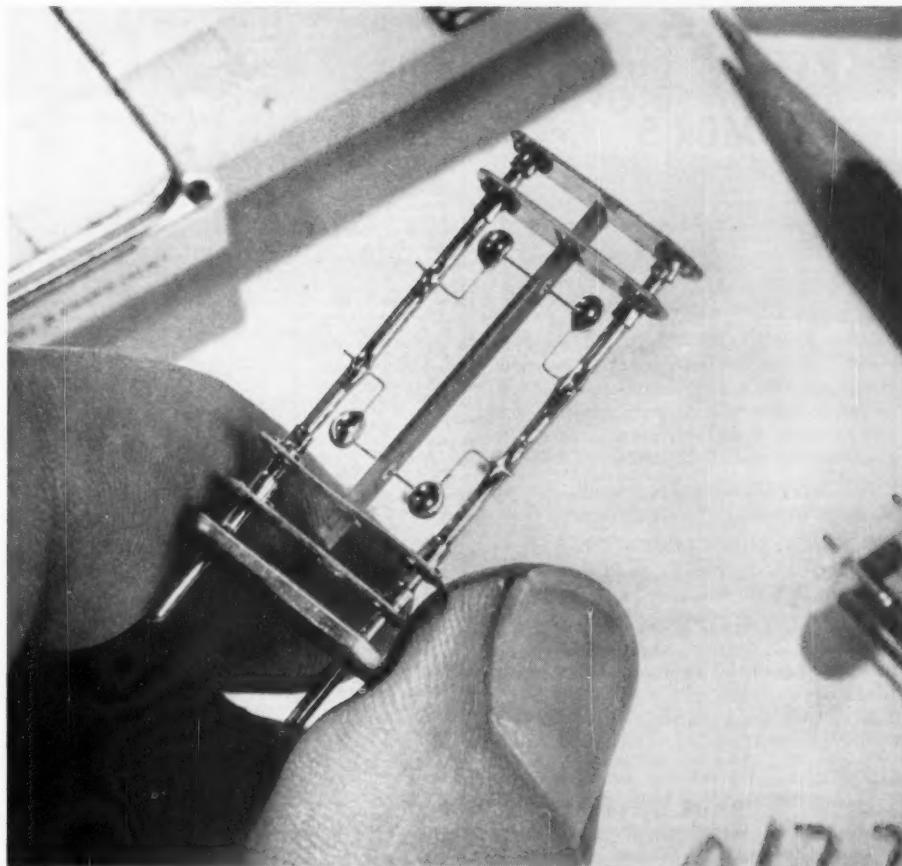
GEORGIA — SCM, George W. Parker, W1NS — SEC: YTO, PAMs: ACH and LXL. RMs: MTS and PIM. Nets: Georgia Cracker Emergency Net meets on 3995 ke. Sun. at 0800, Tue. and Thurs., at 1830 EST; Georgia State Net (GSN) meets Mon. through Fri., 1800 EST on 3590 ke. We report with regret the loss of two appointees who have been very helpful and cooperative. CeJ has resigned as Asst. State Radio Officer of RACES and net control of the Cracker Net. TVL is our new SEC and we are sure that he will prove a good one. OCG, our RM and manager of GSN, has been transferred to Florida. He will be succeeded by PIM in both capacities. Other new appointees are YAK as OPS; DDDY and BXV as ORSs. New General Class licensees in Atlanta are K1s CGT and GCI, the XYL and YL of ZD, and K1s GCL, GCK, and CZR, the XYLS of ZUF, MV, and CEJ. New officers of the Confederate Signal Corps are HYW, pres.; ORL vice-pres.; CFN secy.; DLE, treas.; and TJS, act. mng. KN4ENI is now General Class. The Atlanta Radio Club held its annual Christmas Party on Dec. 2nd at HBOE 75 in Atlanta. Out-of-town guests included PMJ and his XYL from Reynolds. We missed BUD at the party. BXV has a new vertical antenna for 40 meters. LNG is back on the v.h.f. bands with a new 829 on 6 meters. FZO has a new 348 receiver. BWD is working DX. Traffic: (Nov.) W4OCG 333, DDX 216, PIM 158, HYW 57, HVY 56, ZDP 52, ZUF 52, BWI 26, MTS 26, NS 20, ZD 20, BXV 15, IMQ 10, FZO 8. (Oct.) W4OCG 298, HYW 40, HYV 39, MTS 30.

CANAL ZONE — SCM, Roger M. Howe, KZ5RM — VR has been accepted as a relay station for "Operation Deep Freeze." LC has been appointed ORS. W5DHA, ex-KZ5MD, paid us a visit at our last club meeting and gave us a very interesting account of himself and things around Jackson, Miss. DH had the gang over for an antenna-raisng party and hit the air with dipoles on 10, 15, and 20 meters. GF, our QSL Manager, has returned from his Stateside vacation and is back on the air. PP took NCS on the net the other night and did a fine job for his first time out. TV is about to hit the Canal Zone and the KZ5 gang already is brushing up on ways and means of keeping out of channels 8 and 10. Frank Kennedy has been issued KV. BE was hospitalized as the result of a heart attack, but is coming along as well as can be expected. Traffic: KZ5VR 84, DG 52, LB 22, BR 19, EP 18, RM 14, LC 4.

SOUTHWESTERN DIVISION

LOS ANGELES — SCM, William J. Schueh, W6CMN — Asst. SCM: Albert F. Hill, Jr., 6QJB, RMs: K6DQA and W6BHG. PAM: PIB. The 2X4 Net is reaching out for more traffic by sending liaison to c.w. nets. K6GUZ makes WAS and WAC. K6IDDO has a new 7-Mc. vertical and is working lots of skeds. ORS reports 230 Mc. is picking up. AM skeds the Yacht YASME on its world trip. K6OIZ made WAS in the SS. K6BFC raised his DX count to over 90 while laid up with flu. K6IYF is working traffic on SCN and MTN. LPV is DXing these days. The section will miss MBW, who has moved to Arizona. K6OIZ and DNX teamed up for the SS and made 70,000 points. BUK now has the 21-Mc. beam up. UED is rebuilding the whole station. LVQ is doing an FB EC job in Whittier. NJU has a new kw. rig. K6GUZ was up to 400 contacts and then his receiver blew up. Traffic seems to be picking up again; five Los Angeles section men made BPL in November. A new General Class licensee is K6GCV in Riverside, on 7-Mc. phone and c.w. JQB turned in a nice report. K6IRY was host at the Rio Hondo Radio Club November meeting. K6CHN is building a TV transmitter. Congratulations to all the gang on the FB job done on Field Day. As so many of the gang are asking for a section QSO Party, we will have one in May or June

(Continued on page 106)



PRACTICE MAKES *Perfect*

Consistent quality is a must characteristic with Biley BH9A units.

Resonant wire supports, precision alignment, controlled soldering and plating, are the fine points that get special scrutiny, under binocular microscopes, in Biley production. These minute details can determine performance of an otherwise perfect crystal.

Biley BH9A units, in the frequency range 16kc to 250kc, are supplied to individual specifications as military types: CR-37, CR-38, CR-42, and CR-50.



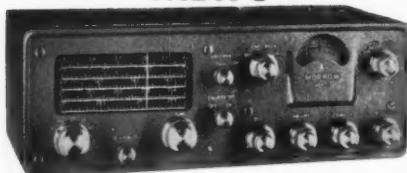
**BLILEY ELECTRIC
COMPANY**

UNION STATION BUILDING • ERIE, PENNSYLVANIA

MORROW

MOBILE OR HOME STATION RECEIVER

MBR 5



All the fine workmanship and dependability of MORROW engineering and manufacturing are built into this new receiver to offer better performance and more value than anything offered to amateurs before. **COMPARE MORROW!!**

HIGH SENSITIVITY—.5 microvolt on all amateur bands.

100 KC CRYSTAL CALIBRATOR—Built in to make it possible to read exact frequencies.

SSB AND CW RECEPTION—Fully temperature and voltage compensated for inherent frequency stability of BFO and mixer oscillators.

SQUELCH AND NOISE LIMITER—The exclusive new MORROW Noise Balance Squelch completely eliminates interstation noise but will readily open on weakest signals. The improved series gate noise limiter is extremely effective in eliminating pulse noises.

ILLUMINATED "S" METER—Measures incoming signal strength and used as a field strength meter for adjusting mobile transmitters to maximum output. A must for mobile amateurs.

NO SPURIOUS RESPONSE—Excellent RF design eliminates images and spurious responses.

HOME STATION OR ANY AUTO—Choice of DC (6-12 volts) or AC (120 volts) pack with receiver. Alternate pack available as an accessory. Companion transmitter MB560 also available at \$189.50.

TUBE LINE-UP—6BZ6 RF — 12AT7 mixer osc. — 6BJ6 IF — 6BE6 mixer, crystal osc. — 6BJ6 IF — 6TB det., BFO — 6AL5 noise rect. — 6AL5 noise limiter — 12AX7 audio amp., squelch — 6C4 audio amp. — 6AQ5 audio output — 6BJ6 crystal calib. — 12AT7 noise amp., "S" meter.

ECONOMY PRICED—\$224.50 complete with 6-12 volt DC power supply, MORROW SH type PM speaker, operating instructions and mounting hardware. Physical size: 4 inches high, x 11 1/4 inches long, x 6 1/2 inches deep.



Canadian Office: 801 Dominion Bldg.
Vancouver B. C., Canada

if no other contests conflict. Watch *QST* for an announcement. USY and BHG are both very QRL on SCN and need help. K6EXQ is working toward 28-Mc. WAS. K6DQA is very QRL on his job and running SCN. Much luck in the New Year. Traffic: (Nov.) W6DDE 629, K6HOV 620, FCY 512, W6LYG 414, BHG 402, GYH 353, USY 291, QGX 251, K6DQA 111, W6JQB 83, CR 82, K6KCI 59, W6CAK 55, K6COP 54, KN6MON 28, K6BWD 18, DDO 11, W6ORS 11, AM 8, K6IQF 8, OIZ 8, GUZ 7, W6WT 7, K6BFC 6, CBO 2, ELX 2, LYF 2, W6LPV 1. (Oct.) W6GUX 33, KN6MON 33.

ARIZONA — SCM, Albert H. Steinbrenner, W7LVR — Ast. SCMs: Kenneth P. Cole, 7QZH, and Dr. John A. Stewart, 7SX. PAM: KOY. RM: PKW. SEC: VRB. Arizona Phone Net: Tue. and Thurs. 7 P.M. MST, 3865 ke. also Mon. through Fri. 4 P.M. MST 7115 ke. In connection with the c.w. nets, your SCM is very happy to announce the appointment of PKW, as Route Manager for Arizona. John intends to QSP with the New Mexico Net and six other nets around the country. All interested in joining these nets, please contact John and give him full cooperation. Arizona needs c.w. nets badly, and here is our opportunity to obtain same. The AARC of Phoenix now has a Charles Middleton Memorial Station with the call IO. TPG is the trustee. Phoenix had a picnic at South Mountain Park with sixty in attendance. RTP got his Extra Class license. QFQ is back on the air. This is the last call for license-plate applications. Contact any Phoenix station for information. Your SCM is starting a "wanted" and "for sale" list of ham gear and parts. If you have anything for sale or want anything, write a postal. Traffic: W7QFQ 118, LVR 15.

SAN DIEGO — SCM, Don Stanifer, W6LRU — The entire San Diego section misses ODR, who was killed with his wife as they crossed a street in San Diego. Bob was past-chairman of the San Diego Council of Radio Organizations and a member of the Helix Club. K6EC is now on OO. The Coronado Club has instituted a novel idea; each member must give a 20-minute talk on some phase of ham radio at a meeting. The December meeting of the San Diego DX Club was held at the home of SEG. Three members of the Rohr Club are now Technician Class, K6HLL, HXK, and HLT. K6BGX is home from the hospital recuperating. KN6QOW is now active in Costa Mesa on 2 meters. DEY and BQP have 600 watts of single sideband for 2 meters. K6GEI and W6ECP are building a kw. linear amplifier up Encinitas way. K6MUF is a new Technician Class licensee in La Mesa. New officers of the San Diego Council of Radio Organizations for 1956 are LRU, chairman; K6DKM, vice-chairman; W6KSI, secy.; and CAE, treas. The Brawley Amateur Radio Club has applied for affiliation with ARRL. It is quite a live-wire group in that area. Officers are UGM, pres.; QPK, secy.; treas. The various AREC groups in the section did an admirable bit of service during the pre-holiday season, utilizing their mobile facilities for annual parades. KN6PGO is a new Novice in the Pt. Loma Area on 7 Mc. HU, in Anaheim, is now an ORS. IAB and YDK continue to handle large amounts of traffic each month. Congratulations to the Helix Club on ranking second in the nation in the four-transmitter class in the 1955 Field Day. Traffic: (Nov.) W6LAB 2572, YDK 1665, K6DBG 50, W6BKZ 16, (Oct.) W6YDK 1814.

SANTA BARBARA — SCM, William B. Farwell, W6QIW — New General Class licensees are K6CVR and K6JRT. The Santa Barbara v.h.f. gang will form a new traffic net on 2 meters, and will install a repeater station on Santa Ynez Peak. Such a repeater would complete the chain of 144-Mc. communications between San Diego and San Francisco. K6HTX is active on 75 meters. K6ATX has a chance to swap a speed graphic for a Supreme transmitter. NKT and ENR are now OO Class I. The SLO Radio Club sponsored two contests in Nov., one to contact as many California stations and the other as many states as possible in one month. NKT has his 200-watt rig going again with a new antenna. BNZ and OTO were heard going full swing in the SS. New officers of the Ventura Club are Don Ross, pres.; Bill Farwell, vice-pres.; Diane Smithers, secy.; Geo. Sadorus, treas. The Oxnard Club is moving to new quarters. Santa Barbara Club will hold an election. Traffic: K6NBI 102, KPU 14, W6QIW 6, FYW 4.

WEST GULF DIVISION

NORTHERN TEXAS — SCM, Cecil C. Cammack, W5RRM — SEC: PYI. PAMs: TFP and IWQ. RM: PCN. Since April K5AQD has maintained almost daily contacts with Peru on 20 and 15 meters; incentive — a brother in the Amazon Jungle Area. West Texas newspapers complimented WB7, NFO, SMK, YPI, RP, NEW, ILA, TWO, BFK, YIB, and PML for gathering Canadian River Municipal Water Authority election returns by 8:15 P.M. for publication. The Wichita Falls ARC has a new club house. JQD reports the South Plains ARC 10-meter Net has been reactivated on 29 Mc. at 1900 Fri. FBM reports SNX and KN5BDX spoke to the Terry County ARC and visitors on 2-meter operation and gave demonstrations. AVA has two 6-meter transceivers under construction. SFA is aeronautical mobile on 75 meters with a 6L6. OYF, YPI, (Continued on page 108)

HARVEY **ALWAYS HAS IT...IN STOCK**
For IMMEDIATE DELIVERY

- **THREE BANDS** 10, 15, and 20 Meters
- **ONE BEAM**
- **ONE FEED LINE**



CENTRAL ELECTRONICS
SSB EQUIPMENT

Multiphase Exciter... Model 20A

20 watts peak output on AM, PM, CW and SSB. Single switch for sideband selection. VOX on AM, PM and SSB, plus break-in on CW. Bands switching: 160 thru 10-meters. Has magic eye indicator for carrier null and peak modulation. Choice of table or rack model.

Wired \$249.50 Kit \$199.50



Designed expressly for Central Electronics SSB Exciters Model 10A, 10B and 20A. Variable frequency oscillator for 75 and 20-meter bands. Complete band coverage on 75 and 20 meters. No modification of exciters required.

Wired \$49.95 Kit \$39.50



ELDICO SSB-100
Single Sideband
Exciter-Transmitter
Write for Complete Literature

We're Generous
On Trade-Ins
If You Want To Talk
SWAPS and DEALS
write... or call W2DIO

NOTE: Prices Net, F.O.B., N.Y.C.
Subject to change without notice

For many years, hams have been searching for a single antenna that could be fed efficiently with a low-impedance transmission line on several bands. Such an antenna is available—now—and only HARVEY has the W3DZZ beam in the New York area (we will ship anywhere). A refinement of the unique design by W3DZZ (Chester L. Buchanan), the new parasitic beam array is manufactured by the FREDERICK TOOL & ENGINEERING CORPORATION.

The design (see QST, March, 1955) is based on the principle of isolating sections of an antenna with lumped-constant resonant traps, so that the system has suitable modes of resonance corresponding to a number of amateur bands. The variation in antenna feed-point impedance from band to band is kept to an absolute minimum, so that standing waves on the feed line—the band of multi-band single antenna operation—are minimized. The incidental loading effect of the traps also keeps the length of antenna elements to a minimum.

Model FT-100 Beam Antenna—a Multi-Band Parasitic Array for 10, 15 & 20 Meters. Light weight—only 55 lbs. • Total length of elements less than 28 ft. • Clean design with shortened elements gives low wind resistance. • Uses RG8U as feed line. • Trap capacitor insulation is of highest quality polystyrene.

\$195.00

The W3DZZ Design Also Applies to Wire Antennas

Model FT-200 Set of Traps for Wire Antenna Operating on 10, 15, 20, 40 and 80 Meters

(75 ohm twin lead or coax feed line)

Concentric coil and condenser completely potted in polyester resin. • Polystyrene insulation of concentric capacitor can withstand highest amateur transmitter voltages.

Pair \$125.00

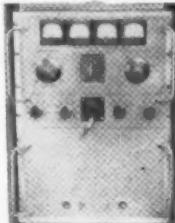


ADAMS ELECTRONICS

**Model 1010 1KW
LINEAR AMPLIFIER**

A front-panel band-switching amplifier using a 4-400A in AB-1. Needs only 4-5 watts drive. With pi-network tank circuit, variable-vacuum capacitor, forced-air cooling, complete shielding, high-efficiency band-switching turret, and four large 3" illuminated square meters. Complete with tubes, bias and screen supplies.

\$650.00
With high-voltage power supply \$875.00



HARVEY is known the world over... wherever Hams operate... as a reliable source for Ham Equipment... assuring fast service and prompt deliveries.



Harvey **RADIO CO., INC.**

103 W. 43rd St., New York 36, N.Y. • JUdson 2-1500

Established 1927

Our
tests
show

-00000-

over

HIGHEST KNOWN "Q" IN MOBILE COILS.

Get fixed station performance
with these 4 precision coils.
You choose maximum efficiency
for band you want. Use with
60" whip, 36" base section.

Tunes to compensate
for your installation.

See the new Vaaro-Davis
"500 Series" coils now
at your distributors.

The "original" coils sold
with a money-back guarantee



DAVIS ELECTRONICS

Vaaro Mobile Division
4002 W. Burbank Blvd.
Burbank, California

Write for FREE Literature

and a mobile relayed Stamford-Burkburnett football scores for KSEY, Seymour. RHP reports NETE. Net average attendance for November was 77 per cent. ZTB and ESR are the new NCS and ANCS for the NTE Net. ZTG has a new Q-Multiplier. The East Texas ARC had a steak dinner at IYJ's, near Chicken Feather. LTB is now mobile. FJB and FIT each have a new DX-100. FIS is s.s.b. with 10 watts. FIP is building a 15-meter fishing-pole beam. The Panhandle ARC's new call is K5CQF. The club is running a series of code practice sessions with VUV, act. dir., cracking the whip. COQ has moved to Amarillo. The Abilene ARC assisted the Abilene Kiwanis Club in conducting a Telethon on KRBC-TV for the benefit of the crippled children's home, collecting over \$12,000.00 net. Traffic: W5UBW 330, BTH 205, FNV 247, KPB 221, AHC 200, BAT 184, K5AQD 115, W5BKH 106, PCN 62, DYU 31, TFP 27, CF 25, FCX 22, RP 22, YPI 19, ASA 18, PAK 16, ZTG 16, OCV 13, RRM 11, GHU 2.

OKLAHOMA — SCM, Dr. Will G. Crandall, W5RST — Asst. SCM: Ewing Canady, 5GJQ, SEC: KY, RM: GVS, PAM: PML, SVR, and ROZ. The new officers of the Aeronautical Center Amateur Radio Club are RDI, pres.; VRV, vice-pres.; EHC, secy.-treas.; INQ, act. mgr.; BKN, asst. act. mgr. The two young McAlester YLs, ILO and IOZ, and K5BNQ from Broken Arrow attended the anniversary party of the Texas YL Roundup Net in Dallas on Nov. 19. Oklahoma hams are honored by having one of their number, PIG of Seminole, selected as a Rhodes Scholar. It would be interesting to know how many hams became Rhodes Scholars and how many Rhodes Scholars became hams. It is interesting to note that s.s.b. stations are passing traffic on regular phone nets without difficulty and there are more contacts heard between a.m. and s.s.b. stations, which is significant. Traffic: K5AOV 254, W5MRK 86, FEC 64, MFX 40, QAC 36, PNG 29, ADC 23, CPG 13, PML 13, SWJ 13, JXM 12, REC 11, SVR 11, TNW 10, RST 9, GXH 4, UCT 3.

SOUTHERN TEXAS — SCM, Morley Bartholomew, W5QDX — SEC: QEM. Those of you who are active in the NTO Traffic Net can get your Section Net certificate from TFP, APP and his XYL visited in Austin the first weekend of December. K5AWL is on with a Harvey Wells and a long-wire antenna. PRO still is fighting bugs in his 813 rig. K5COU is a new ham in Corpus Christi. Ed has gotten twenty states after one month's operation with 65 watts. JXP assisted him in preparing for his license exam. Zone 4 members of STEN are moving to 72.75 kc, after Sun. drills and are enjoying a round-table QSO together. CKW has four 837s driven by a 10B running 400 watts s.s.b. on 75 meters. Your SEC, QEM, has been successful in securing 3860 kc as a clear frequency in case of emergency. A letter from Mr. P. H. Herndon, Jr., FCC Regional Manager, granted this request. LUU has been to Louisiana on a business trip. VPQ made a trip to Carlsbad Cavern with some of the members of the Spelunkers Club. BE and FND have joined the San Antonio RC transmitters hunters. EDZ is sporting a new NC-300. CQY has a side-band slicer on his HRO. The San Antonio RC enjoyed a Christmas Party and dance at Wolff's Inn Dec. 16th. The Austin ARC is making plans for code and theory classes. Don't be surprised if you hear the Dallas Chess Club vs. the San Antonio Chess Club on 75 meters. THU has his 20-meter beam working. Traffic: W5ZWR 34.

NEW MEXICO — SCM, Einar H. Morterud, W5FPB — PAM: GQA. The NM EPN meets on 3838 kc, Tue. and Thurs. at 1800 MST, Sun. at 0730; the NM Breakfast Club meets on 3838 kc, daily except Sun. at 0700-0800 MST; the NM C.W. Net meets on 3633 kc, daily at 1900 MST. Thanks to GQA for accepting the appointment as PAM. We still need an RM and an SEC, as well as several OBSs. K5DAA, Al, and DAB, Ruth, are on from Carlsbad. NXF has his WAC certificate. GCI has an AT-1 with VFO and modulator. DWT has had three articles published in two months; he just got his final repaired from one contest and it blew up again in another contest. CXC, while mobile 27 miles from Roswell, came upon an auto accident and summoned ambulance and police through fixed stations. PXA, while mobile in the outskirts of Albuquerque, also came upon an accident and summoned ambulance and police through a fixed station. ROH has a vertical antenna. Will the secretary of each of the section's radio clubs PLEASE send me news items the first of each month so that there will be some news other than that from Albuquerque. Traffic: (Nov.) W5CEE 30, DWT 19, K5FEF 14, W5UAR 11, BZB 9, GQA 8, TBP 8, ZU 4, FPB 3, BIH 2, (Oct.) K5FHU 53.

CANADIAN DIVISION

MARITIME — SCM, Douglas C. Johnson, VE1OM — Asst. SCMs: Fritz A. Webb, 1DB, Aaron D. Solomon, 1OC, SEC: RR. A new appointee is ZMI as EC for Charlottetown. C.W. operators are urged to use 3535 kc, as their hangout. This frequency will be monitored at all times by VE1, VE2, and VE3 stations and should prove of great value for emergencies, traffic, and ragchewing within Eastern Canada. HQ, TS, EE, FN, IW, and FC received praise for their work with their mobiles in assisting the parking

(Continued on page 110)



**TOP - TRADE
VALUES
GUARANTEED!**

AT

Leo. Z. Meyerson
WØGFQ

Latest Receiver, containing Tee-Notch; — a stable non-regenerative system for reducing heterodyne interference and steepening the already excellent 50 Kc. IF pass band. Other superior features: antenna trimmer, 100 Kc. crystal marker, new precision dial, gear drive disc system, selectable side band operation, low drift and others. Contains 15 tubes. Frequency range: 530 Kc.-1500 Kc., 1720 Kc.-34 Mc. For full details, write today! Grey black steel cabinet: 18 $\frac{1}{2}$ ''x8 $\frac{1}{2}$ ''x10 $\frac{1}{2}$ ''.

SX-100 Receiver



Only
\$16.08
Per Month

Cash Price: \$295.00
Pay Just 10% Down

ONLY
10%
DOWN
PAYMENT!

plus
hallicrafters

S-38D
SX-96
SX-99
SR-500
S-53
S-85

HT-30 Xmtr./Exciter

\$26.98

Per Month
Pay Just 10% Down
Cash Price: \$495.00



Delivers AM, CW and Single Side Band suppressed carrier transmission. Built-in VFO, with provision for quartz crystal, calibrated directly in Kc. Bandswitching for 80, 40, 20 and 10 M. Built-in voice control. 35 watt peak output on S.S.B. TVI suppressed, control circuits and AC power lines filtered. Bias supply for final outboard amplifier. Unwanted sideband at least 40 db. down or more. Contains 20 tubes. Many other top-notch features. Compact: 18x9 $\frac{1}{2}$ x12 $\frac{1}{2}$. Write for complete specification sheet!

Full bandswitching linear power amplifier employing two 811-A zero bias triodes in parallel; highly stable, extremely versatile. Power input: 500-510 watts. Continuous frequency coverage from 3.4 Mc. to 30 Mc. Pi-network output for efficiency harmonic and TVI suppressed. Major TVI suppression built-in. No antenna tuner required; — feeds loads from 50-600 ohms. Full metering of all important circuits. Satin black cabinet with brushed chrome trim: 20x12 $\frac{1}{2}$ x17 $\frac{1}{4}$.

HT-31 Linear Power Amp.



Only
\$21.53

Per Month
Pay Just 10% Down
Cash Price: \$395.00

FREE
CATALOG!

Over
15,000
Items



**Write for Specification Sheets on the
COMPLETE WRL LINE**

- ★ Globe King 500A
- ★ Globe Scout 65A
- ★ WRL's New VFO
- ★ Antenna Kit
- ★ 6 Meter Converter
- ★ Antenna Tuner Kit
- ★ Economy Code Oscillator
- ★ Plumber's Delight Beams
- ★ SWR Bridge

Please send me your Free 1956 Catalog, and information on items listed below! Quote your Top-Trade-In Offer

QH-2

ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE.



3415 W BROADWAY, CO. BLUFFS, IA. Phone 2-0277

for my Name and Make of Equipment

on your (New Equipment Desired)

Radio Map (25c) 1) _____
 2) _____ 3) _____

Name

Address

City and State

Send for FREE CATALOG

See What's New in
ELECTRONICS
Radio • TV • High Fidelity

Send for **NEWARK'S 1956 CATALOG**

See the latest and finest equipment ever offered in High-Fidelity, Radio, TV, Amateur and Electronics. Select the fast, dependable way, from this new 260-page catalog.

NEWARK
ELECTRIC COMPANY

Dept. T-2 223 W. Madison, Chicago 6, Ill.

WEST COAST BRANCH
4736 W. Century Blvd., Inglewood, Calif.

L M B BOX CHASSIS



Flangelocking

Precision Engineered



Interlocking

62 sizes and shapes for the laboratory, manufacturer, industrial, experimenter, builder and general application where metal boxes are required. Stocked by electronic and geophysical distributors. Send for free catalog.

LMB 1011 Venice Blvd., Los Angeles 15, Calif.

officials at the St. John Exhibition. FH and his CB Emergency Net did a fine job on Exercise "SET" Oct. 15th. This test run helped them when they were called into action during the storm of Nov. 20th and also in the rescue of the crew from the Kismet II. WF, VN, SI, and VC are sporting DX-100 Heathkits. WK is back on the air from a new QTH. The XYLs of the Glace Bay gang are working for their Class A tickets. YV now is located in Dartmouth. AM and KZ have weekly skeds with VESSP at Nott Island. OC, XD, PZ, ZF, ME, and FH handled traffic on Nov. 21st for CNT, MT, and T during the blizzard clean-up period. VO6I is back on the air with his Viking II on 20 and 75 meters. VO6U is working 10, 15, 20, and 75 meters. IQM is putting up a new antenna for 75 meters. The Maritime Net is going great guns on 3750 kc. seven nights a week. This is FQ pinch-hitting for your SCM, who is in Toronto at this writing. Traffic: VE1FQ 281, AO 175, VO6U 90, VE1AV 75, UT 68, FH 64, VO6AH 49, VE1OM 47, ME 22, YB 9, KZ 8, BN 4, DB 4.

ONTARIO — SCM, G. Eric Farquhar, VE3IA — It is with a heavy heart that we record the untimely passing of three fine people and offer sincerest condolences to KM on the loss of his mother, a lovely lady who behind the scenes did much for ham radio. We can recall with pleasure the early days of the Hamilton Amateur Radio Club, when it held its early meetings in her house and she always tended to the wants of the inner man. To the families of BSQ, who was a valued member of the Quinte Radio Club in Belleville, and BJS, well known for his fine personality and operating ability in Lockerby, we also extend condolences. The losing of these outstanding persons makes the writing up of this report most difficult. DN is getting good results on 15 meters using a rotary dipole. BRI is heard mobiling from numerous places in the section. He sure gets around. DSM won the first certificate awarded by Nortown in the "Worked all Nortown" contest. Events of this type go far in encouraging club activity. BJV, interested in photography, is rebuilding his rig between shots. Pictures, that is! Mark your calendars for Mar. 9th through 17th. That is when Nortown will operate at the Sportsman's Show in the Toronto Coliseum. NG will be coordinator. CJ, ARF, WT, RG, and NG were heard passing traffic relative to their deer-hunting activities. On the London Club's agenda recently was the showing of Field Day slides by George Ross and a newly-completed VFO by DDE. Contacts of three miles distance with transistor transmitters have been achieved by CAB and AAS. Traffic: VE3VZ 197, NG 72, DPO 39, BUR 37, NO 35, BZB 27, TO 27, AJR 17, AUV 13, PH 8, APL 6.

QUEBEC — SCM, Gordon A. Lynn, VE2GZL — NK is getting the cobwebs out of the rig preparatory to getting on the air after a long absence. IB has been posted to Germany and has taken his rig with him. AFC is active on 15 meters keeping skeds with VP6YB, whose daughter works in Quebec City. AFC uses an NC-98 and a Viking Ranger. EO is moving to Fort Wayne, where he expects to operate portable W9. ATD is back on 20- and 15-meter phone with 125 watts. ADX, the South Shore Club station, skeds the Ontario Phone Net at 1900 hours on Tue. and conducts code classes every Tue. night. KG reports good 2-meter results, contacting W2CFY, Malone, N. Y., and other stations in Maine, Vermont, and New York. YU reports most of his operation in November was in the SS Contest, where he made 414 contacts in 69 sections for 71,022 points! The St. Maurice Valley AREC has acquired a semi-trailer on which they plan to put a mobile unit. EC, AEM, KJ, UB, and AOB sked daily at 0830, 1300, and 1600 on 3690 kc. CA reports work is interfering with operating. Phyl worked a few VE8s and some DX lately. FL reports that because of poor receiving conditions during the daylight in his part of the country activity is limited. The Northland Net now meets twice weekly at 1915 on 3755 kc. Wed. and Fri. The VE2 gang extends congratulations to BE on his re-election to the post of Canadian Director. Traffic: VE2DR 104, EC 33, CA 32, ATQ 7, FL 7, LM 7.

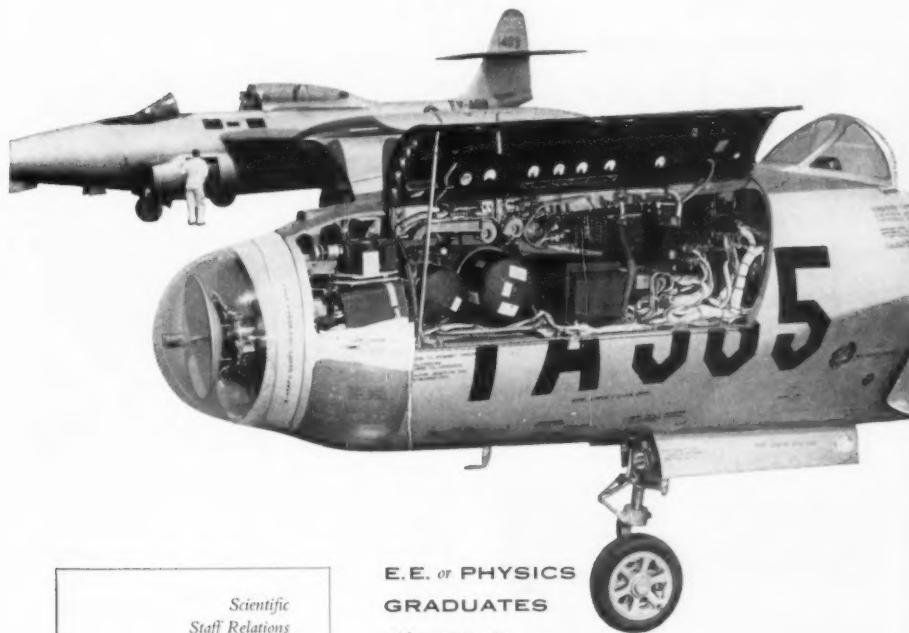
ALBERTA — SCM, Sydney T. Jones, VE6MJ — PAM: OD, RM: XG. Congratulations to EO on his election to the post of Vice-Director of the Canadian Division. NX is the new EC for the Edmonton Area. HM has had a banner month in traffic to the north. FB is back on 3.8-Mc. phone after an absence of several months. The Lethbridge AREC holds practice sessions on Sun. mornings on 3740 kc. WC reports the rebuilding is going very slowly. YE holds forth with "Ye Swap and Shop" on Wed. evenings after the net. The Calgary AREC gang was very active during a recent community project. EA, WO, KC, NAD, and MJ are about ready for 144-Mc. operation. As well as being an active member of the Alberta Phone Net, 7HD finds time to play with hi fi. CP is leaving Edmonton for Bogota, South America. All the very best, George. Look for us on 21 Mc. Traffic: VEGHM 224, YE 33, OD 23, IZ 5, VE7HD 1.

BRITISH COLUMBIA — SCM, Peter M. McIntyre, VE7JT — SEC: DH. The longest reports received are those from XY via the Dawson Creek Amateur's *Grid Leak* every three weeks. They are going ahead with a training program which at the moment has twenty prospective hams in it. The northern section will have more hams than snowflakes if the Dawson Creek amateurs can do it. I suppose

(Continued on page 112)

Use Your Military Training

The time was never more opportune than now for becoming associated with the field of advanced electronics. Because of military emphasis this is the most rapidly growing and promising sphere of endeavor for the young electrical engineer or physicist.



Scientific
Staff Relations

Hughes

RESEARCH AND
DEVELOPMENT
LABORATORIES

Culver City
Los Angeles County
California

**E. E. or PHYSICS
GRADUATES**
with experience in
RADAR or ELECTRONICS

or those desiring to enter these areas...

Since 1948 Hughes Research and Development Laboratories have been engaged in an expanding program for design, development and manufacture of highly complex radar fire control systems for fighter and interceptor aircraft. This requires Hughes technical advisors in the field to serve companies and military agencies employing the equipment.

As one of these field engineers *you will become familiar with the entire systems involved, including the most advanced electronic computers.* With this advantage you will be ideally situated to broaden your experience and learning more quickly for future application to advanced electronics activity in either the military or the commercial field.

Positions are available in the continental United States for married and single men under 35 years of age. Overseas assignments are open to single men only.

It's Fun to Go After DX AWARDS

DXERAMA

tells you how to do it and gives you a place to log your progress. More than 30 Awards from all over the world fully explained: DXCC, HV22, TPA, everything from AAA to WWI. Nicely printed on good paper, heavy covers, well indexed, 8½" x 11", 64 pages.

\$1.35 U.S.A. & Possessions

Compiled by W3AXT

Order from your Distributor or direct from

DXERAMA RFD 1, Box 127, Lancaster, Pa.

\$1.60 Foreign

when you read this you will have been able to admire all the new gear you got under the Christmas tree. The Vancouver gang had a meeting of mobiles and out of a possible 39 amateur's known mobile status 23 turned out, ZF and his XYL had a close call driving over the Hope-Princeton Highway. We hope by now that Verona is well on the way to complete recovery. Just a reminder to all the readers that in your amateur regulations there is a difference between handling traffic and commercial significant traffic. If you haven't got the regs, a call at your R.I.'s office will enable you to obtain a copy. I think it would be a good idea if we all got one and read it once in a while. It would save receiving notices from D.O.T. with embarrassing contents. Also remember we have to look after ourselves to prevent accident and nobody wants to put his license in jeopardy because of ignorance of the rules. Traffic: VE7ASR 84, DH 39, ZV 32, AUF 31, JT 30, XV 30, OC 23, FS 10, AIO 8.

SASKATCHEWAN — SCM, Harold R. Horn, VE5HR

The Hamfest this year will be sponsored by the Regina Club and plans are now under way for the affair. BZ is kept busy with VE5-Land. CW is building a Panadaptor. HW visited VE5-Land and was in on the flood emergency on the Vancouver North Shore. I would like to congratulate the VE7SEC and SCM for the efficient way the emergency work was handled. XX was a Saskatoon visitor, 7RZ (ex-50W) and his XYL send their 73 to the VE5 section. CD is a new civil defense station at Saskatoon. Let's have some news for this column, fellows, please. It cannot be made up unless you let us know what you are doing. Traffic: (Nov.) VE5LM 61, BF 4, BZ 4, GO 1, VL 2, LJ 1, (Oct.) VE5CW 60, LM 50, BZ 25, RE 18, GX 11, BF 10, DD 8, CB 6, GO 2, HJ 2, LJ 2, PJ 2, RG 2, QL 1.

HOW TO HAVE THE FINEST RIG

Without Hurting the Family Pocketbook!

Hundreds of hams are making their hobby pay for itself—by making FCC-required checks on commercial mobile-radio equipment. It's one of the fastest growing fields in electronics . . . and you can work right from your home!

With a 2nd class 'phone ticket . . . plus test equipment most hams have . . . and the Lampkin meters shown below . . . you'll be able to earn cash for ham gear.



105-B MICROMETER
FREQUENCY METER
Price \$220.00 net.



205-A FM
MODULATION METER
Price \$240.00 net.

LAMPKIN LABORATORIES, INC.
Mfg. Division
BRADENTON, FLORIDA

To learn more about tapping this cash, write today for free booklet "HOW TO MAKE MONEY IN MOBILE RADIO MAINTENANCE."



LAMPKIN LABORATORIES, INC.
Mfg. DIVISION, BRADENTON, FLA.

At no obligation to me, please send

Free Booklet Technical data on Lampkin meters

Name _____

Address _____

City _____ State _____

Ash-Tray Mobile

(Continued from page 20)

Modulator

The modulator, whose circuit is shown in Fig. 2, is built as a separate unit on a $4 \times 6 \times 2$ -inch chassis tucked up out of sight under the dash. The 1955 Chevrolet has a 12-volt electrical system. For this reason, 5AQ5s were selected for the modulator, since their 600-ma. heaters are more suitable for series connection.¹ The paralleled heaters of the r.f. unit (total current 1.25 amperes) are connected in series with the paralleled heaters of the modulator (total current 1.2 amperes). This works out very nicely. In a 6-volt system, 6AQ5s would be substituted for the 5AQ5s and all heaters would be connected in parallel, of course.

Voltage for the carbon microphone is taken from the drop across a portion of the modulator cathode resistor. The microphone push-to-talk switch operates the dynamotor control relay as well as the change-over relay. A system of plugs and cables takes care of all connections between the transmitter, power supply and modulator.

Although this unit was designed for 75 meters, similar units may be made for other bands. The combination of this little transmitter and a single-band crystal-controlled converter² has resulted in an installation that has not only removed the objections of the XYL but has also provided the OM with a mobile rig that will stand up with the best of them.

¹ This results in somewhat high voltages for both groups of tubes. It would be safer to connect a 1.5-ohm resistor in series with the battery.—Ed.

² Deane, "Simple Crystal-Controlled Converters," *QST*, December, 1954.

Scherer, "The W2AEF Converter-ettes," *CQ*, May, 1953.

Bob Henry,
WØARA
Butler, Mo.

Ted Henry,
WB6UOU
Los Angeles



NOW, HENRY DARES TO GIVE YOU THE
ABOVE GUARANTEE . . . Try any receiver or transmitter for 10
days. If you are not perfectly satisfied, return it and all you pay are
shipping costs.

hallicrafters



NEW SX100

For top performance with extra pull
power and ability to tune in stations.

\$29.50 Down

20 monthly payments of \$14.65

\$295.00 Cash Price

A few items in stock for immediate shipment are:

Model	Cash Down	20 Monthly Payments	CASH PRICE
S38D	5.00	2.47	\$ 49.95
S53A	9.00	4.45	89.95
S85	12.00	5.94	119.95
SX99	15.00	7.42	149.95
SX96	25.00	12.37	249.95
SX62A	35.00	17.32	349.95
R46B speaker			17.95
HT30	49.50	24.50	495.00
HT31	39.50	19.55	395.00
S94-S95	6.00	2.97	59.95

Write, wire, phone or visit either store today.

Butler 1, Missouri
Phone 395

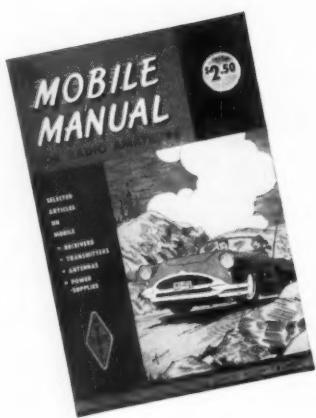


Henry Radio Stores

Brodshaw 2-2917
11240 West Olympic Blvd. Los Angeles 64



"World's Largest Distributors of Short Wave Receivers."



LATEST addition to the family of widely-read ARRL publications, this manual is a useful and informative guide to mobile radio. It is a collection of many articles on tried and tested equipment, presented in an orderly fashion for easy reading and reference.

CONTENTS include a section on receiving, with valuable information on automotive noise suppression; a group of articles describing over 30 different mobile transmitters; sections on mobile antennas and power supplies; and excerpts from FCC's regulations governing mobile operation. The Mobile Manual for Radio Amateurs should be on the bookshelf of everyone interested in the installation, maintenance and operation of mobile stations.

\$2.50

U.S.A. Proper

\$3.00 Elsewhere

**AMERICAN RADIO
RELAY LEAGUE**
WEST HARTFORD 7, CONN.

Antenna Tower

(Continued from page 22)

Any point on the hinge axis will do. Thus the guy wires will always be taut whether the tower is up, down, or in transit, and thereby remove any stress on the hinge pin that may occur with the tower being off dead center.

When the tower is fully up, brackets bolted into the wall near the second-floor window secure the towers. The bracket in itself prevents the tower from falling in any direction. In addition, the two guys and the rope acting as a guy provide an extra factor of safety. The tower is easily raised or flopped over into the back yard by pulling on the rope or paying it out from the shack window. A 5-foot stepladder appropriately placed in the back yard will stop the mast before the beam elements hit the ground.

It is of course necessary to eliminate any obstacles in the path of the moving guy wires or to place them at a point that avoids the possibility. Despite all planning, interference could not be avoided with the telephone lead-in wire. The local telephone company was glad to relocate the 'phone wires for the nominal fee of two dollars.

Two large screw eyes are driven into the center beam of the peak of the roof, to provide some factor of safety if one happens to pull out.



When the tower is lowered for beam adjustments, it rests on a ladder.

The guy wires are also duplicated for safety reasons. Anchors for the guy wires were provided by driving into the ground 6-foot long iron poker of the type used to tend to home furnaces. The rings on the ends of the pokers provide convenient attachment points.

The pulleys are available through either Sears or Montgomery Ward, as is the $\frac{1}{2}$ -inch diameter weatherproofed rope, rated 2650 pounds tension. The tower is all aluminum, requiring no maintenance. The particular model I have is an Alprodeco, 11 inches on a side. It weighs one pound per foot, costs approximately \$1.30 per foot, and comes in 6-foot sections that are

(Continued on page 116)



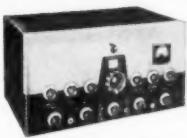
FORT ORANGE

Radio Distributing Co. Inc.

904 BROADWAY, ALBANY 4, N.Y., U.S.A.
AMATEUR HEADQUARTERS

Uncledave's new catalogue - free.
Write for it!!!!

JOHNSON VIKING II



w/t \$337.50

COLLINS RCVR



75A4 \$595

Matching Spkr \$20

MOSLEY "VEST-POCKET" ROTARY BEAM ANTS AND COILS

10, 11, 15 Meter
VPA1015-2 Bm. 39.89
VP1015-2 Coil 14.95
VPA1015-3 Bm. 59.68
VP1015-3 Coil 22.95
20 Meters
VPA20-2 Beam 44.73
VP20-2 Coil 14.95
VPA20-3 Beam 66.37
VP20-3 Coil 22.95

J38 Keys \$1.25

Hand carbon mics.
similar to T17B \$1.95

Write Uncle Dave
W2APF
with your needs
and problems.

Call Albany 5-3379; nites, 2-7729

PARTIAL LIST OF USED EQUIPMENT

Hallicrafters S40A	\$75.00
Lysco 600S Demo	175.00
NC183D with speaker	350.00
Collins 32V2	450.00
Hallicrafters S40B	85.00
Heath AR-2 receiver	25.00
National NC-183	150.00
3 Eldico TR75TV	50.00
	ed.
Hallicrafters SX18 w/spkr	75.00
National NC-125 with speaker	175.00
Millen VFO	75.00
Harvey Wells (TBS50C-APS50)	100.00
National NC-240D with speaker	195.00
National NC-183D with speaker	325.00
Hallicrafters S76	145.00
RCA AR-60-S receiver	75.00
Meissner EX Signal Shifter as	25.00
Hallicrafters SX-71 receiver	175.00
Lysco 600	95.00
Webster 80 wire recorder	50.00
National NC-46	75.00
RME-MC55 converter	50.00
Collins 32V3 Demo	695.00
Hallicrafters SX88 Demo	575.00
Johnson Viking Kilowatt (Reg. 1495)	1120.00
Johnson Viking Ranger (Demo)	265.00
Gonset 3026 communicator (w/carbon mike)	190.00
Collins 75A2 Receiver	350.00
Collins 75A1 Receiver	275.00
Heath AT-1 Xmtr.	30.00
Hammarlund HQ 129X (w/spkr)	175.00
Hallicrafters SX17 (w/spkr)	75.00
BC342 (110 V. A.C.)	75.00
BC458A	17.50
National HROW (15 coils-P.S.-spkr)	150.00
Hallicrafters SX26	85.00
National NC173 (w/spkr)	175.00

HALLICRAFTERS SX100



\$295
R46B \$17.95

HT-30



\$495

B & W 5100-B TRANSMITTER



\$475



NATIONAL NC300

\$369.95

2-6-1 1/4 mtr.
conv. \$39.95
Matching spkr 17.00

GONSET G66

6 band rcvr.
Write for Price

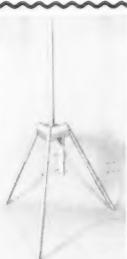
NET CONTROL

STATIONS
Write for your free
logs and message
pads

24 HR. SERVICE
on stock items

WE SPECIALIZE IN FOREIGN TRADE

NOW!



**The
NEW**

DELTA-TENNA

**custom engineered for all VHF
and UHF Applications includ-
ing 2, 6 and 10-11 meters
220 and 420 Mc.**

Manufactured by Western Gear Corporation and expertly engineered for maximum efficiency, DELTA-TENNA is a new, vertically polarized antenna for amateur, commercial and military installations. Here are some features of the new DELTA-TENNA:

- 1 Low standing wave ratio, excellent match to 52 ohm RG8U coax.**
- 2 Gold anodized elements, assuring extra long life in adverse weather conditions.**
- 3 1" diameter driven elements and 3/4" radials offer a maximum of radiation surface and uniformly excellent loading for the entire amateur band for which it was designed.**
- 4 Attractive appearance, an aid to overcoming usual objections to transmitting antennas.**
- 5 Light weight, low wind loading.**
- 6 Built-in coaxial fitting. U-bolts on bracket for simple attachment to vertical pole.**
- 7 Unusually rugged design enables these antennas to handle comfortably in excess of a kilowatt of power.**

**DISTRIBUTORSHIPS AVAILABLE.
WRITE TODAY FOR DETAILS.**

2-meter.....	\$19.95
6-meter.....	24.95
10-11 meter.....	29.95
220 megacycles.....	18.95
432 megacycles.....	16.95

See Your Distributor or Write:

WESTERN GEAR CORPORATION

Electro Products Division

132 W. Colorado St., Pasadena 1, Calif.

easily bolted together. The manufacturer states the tower should be guyed every 24 feet.

For those who think that wind noises and tower creakings might be transmitted to the house frame through the wall bracket, I can report that there are none. The tower has now been through two hurricanes without any noticeable deflection or creaking. The coaxial line and control cables are taped to the side of the tower at 2- to 3-foot intervals to prevent slapping in strong winds. It is conceivable, however, that a full-sized beam used on the tower in conjunction with a frame house might generate some noise that could be transmitted through the wall.

Since putting up a 30-foot tower of the type described, it has been a major convenience in adjustment of the beam antenna. The beam has been up and down countless times in a matter of minutes, but now it's really peaked for performance.

Crystal-Controlled VFO

(Continued from page 37)

operation on the high-frequency side of 75 meters. Many different combinations of crystals may be possible, especially where the operator wants to end his difficulties with drift of the VFO or other problems arising from frequency shift. For the present, this seems to be the answer to single-sideband frequency control for fixed or mobile operators.

Circuit Analysis

As can be seen in the schematic, the main tuning capacitor consists of four variable capacitor sections¹ operating from a single dial with the rotor shaft grounded. This is used as the feed-back circuit for both tubes. Single capacitors can be used or two split stator units; however, the single four-gang miniature type used was found to be the smallest as well as the most flexible. It was taken from some surplus gear and has ceramic insulation and provision for grounding of the rotor sections. Everything else in the circuit is completely straightforward and should be no problem for anyone to assemble as well as put in operation. There is nothing tricky or difficult in the circuit. The output of the Pierce oscillator is fed directly into a 6U8 shielded tube. The tube elements are used in a cascade arrangement for bringing the output up to the desired power level.

MEMBERSHIP CHANGES OF ADDRESS

Four weeks' notice is required to effect change of address. When notifying, please give old as well as new address. Advise promptly so that you will receive every issue of *QST* without interruption.



Richard J. Curzon, KØAIS, works his World Radio 500A Globe King in his shack at 4545 North 39th Street, Omaha, Nebraska! Other equipment used by Dick includes a Collins 75-A1 receiver, Q-Multiplier, WRL's new VFO, and a 6 element, Mosley 10-20 beam.

**World Radio's
500A GLOBE KING
\$6750
Or Pay Just \$67.50 Down
and \$36.78 per month**

**World Radio's
VFO
\$5995
Or Pay Just \$6.00 Down
and \$5.00 per month**

**World Radio's
65-A GLOBE SCOUT
\$9995
Or Pay Just \$10.00 Down
and \$7.95 per month**

**In Our 20th Year of Service to the
Amateur, Experimenter, Hi-Fi Enthusiast!**

**Please send me: Your Free 1956 Catalog, and complete information
on the: Globe King Globe Scout
 VFO**

Q-2



Name: _____

Address: _____

City & State: _____

**WORKS LOTS OF D-X;
NO TVI,
WITH HIS
WRL
GLOBE KING**

World Radio Laboratories,
3415 West Broadway,
Council Bluffs, Iowa

It has been about three months now since we purchased our 500-A Globe King Transmitter. We thought that we would take this opportunity to write you and let you know how pleased we are with our rig.

Since putting the Globe King into operation, we have had a wonderful experience in Ham radio. The Globe King really performs for us and the VFO that you recently put on the market is a natural companion piece to the 500-A. We have found the stability of the WRL VFO to be of the highest caliber.

It is quite a thrill for us when the D-X stations come back to us and compliment us on our modulation. The rig is a gem-dandy and needless to say, we are very, very happy with our installation. Of major importance to us in the purchase of the transmitter with the power in-put of the Globe King was the matter of TVI. Leo, we have yet to experience any TV eye and in our living room, directly above the Ham shack, we have our TV set and there is absolutely no interference of any kind, even though we do not utilize the TVantenna on our set.

Words cannot describe how happy we are with our Globe King and we never hesitate to recommend this wonderful piece of equipment to the many Hams with whom we talk throughout the world.

Very sincerely yours,

Richard Curzon



You don't need



a bird dog

to find the answers to any ham radio problem. QST has information on single sideband, beginners' gear, mobile equipment, VHF, contests, emergency communications, operating, regulatory matters, DX, RACES, and other amateur activities.

Most active amateurs are members of ARRL, and as just one of many privileges, have QST delivered each month.

Are you a member? If not, join now—dues are \$4 in the U. S., \$4.25 in Canada, and \$5 elsewhere.

**THE AMERICAN
RADIO RELAY LEAGUE
WEST HARTFORD 7, CONNECTICUT**

Crystal Holder

(Continued from page 44)

be such that it will spring back to its bent shape after being compressed.

The flexible electrode is placed on top of the crystal, under the copper plate that makes contact to the holder pin. The cover of the holder is drilled and tapped so that a screw can be used to vary the spacing between the electrode and the crystal. The screw should be at the center of the crystal to have the greatest effect on the oscillation frequency. The range of frequency shift will be from the point at which the center of the plate touches the crystal (low-frequency end) to where the spring tension is too loose to clamp the crystal firmly or the spacing between the electrode and the plate reaches a critical maximum. The activity will drop off quickly before oscillation stops at either end, but across the useful tuning range the output from the average oscillator is fairly uniform. There is little effect on the stability of oscillation except at the extreme limits.

If a fine-thread tap is used a considerable vernier effect can be achieved, but even standard threads make it possible to adjust the frequency fairly smoothly. Care should be used in increasing the pressure, as going too far can easily fracture thin plates. The more bend in the flexible electrode, the greater will be the frequency range. The screw can be turned with a tool, or fitted with a knob. Where exact tuning to a net frequency is all that is desired the adjustment may be made and then sealed with household cement. This also aids in sealing the holder against dust and moisture.

How Much QSY?

Crystals found on the surplus market are finished in two contours. One is perfectly flat, or with only a very slight bevelling at the edges. The other is convex in shape, with a large amount of bevelling. A micrometer will show the difference easily. The convex type will give the greater frequency change in a variable-spacing holder of

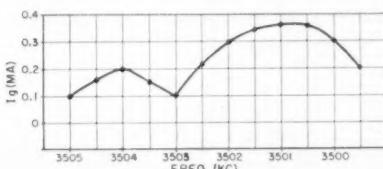


Fig. 2 — Typical activity curve for a modified FT-243 crystal. Activity of crystals may vary considerably from this representative curve. The dip at 3503 kc. results from mechanical relationships in the holder. These may not be present on all modified units.

this type. A convex crystal of around 7 or 8 megacycles can be made to change as much as 8 kc. before the activity falls off below a usable value. A 3.5-Mc. crystal will show up to 7 kc. useful variation.¹

A typical crystal activity curve is shown in Fig. 2. This was taken with a 6F6 oscillator, measur-

(Continued on page 120)

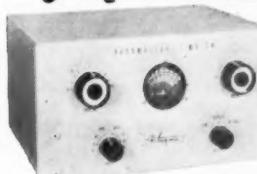


MR. "T"
Says

"Don't Chase Elusive Signals. Tune in on TERMINAL... All-ways on the beam to bring you the **BEST-BUYS** in quality Equipment and Supplies!"

Harvey-Wells

BANDMASTER Z MATCH
ANTENNA COUPLER



Size: 123/8" w. x 63/4" h. x 101/2" d. Only **\$69.00**

Johnson Viking
ADVENTURER CW Transmitter Kit

COMPLETELY SELF-CONTAINED! Power input — 50 Watts • Effectively TVI suppressed • Pi-network output tuning — no antenna tuner needed • Single knob Bandswitching on 80, 40, 20, 15, 11, 10 meters • **COMPACT!** 73/8" high x 103/8" wide x 81/8" deep.
No. 240-181-1 **VIKING ADVENTURER KIT**, with tubes, less crystals and key. Complete with easy assembly and operating instructions.



\$54.95

NEW!



2 Meter Linear R.F.
Power Amplifier

a 10 Time
increase
In Output Power

Model
No. 3063

Quickly... Safely... Economically provides carrier power output at 50-60 watts with a modulated driving source of only 4.5 watts, a requirement met readily by the well-known GONSET 2 meter Communicator.

Features:

Automatic operation; switching Communicator, or other driver, to "Transmit" automatically activates the amplifier and antenna change-over relay...

Output amplifier uses two, 826 VHF triodes, push-pull connected, with FORCED AIR COOLING...

Heavy duty, self-contained 115 volt AC power supply utilizes two 504GB rectifiers in a voltage doubling circuit...

Complete with tubes..... Net **\$149.50**

9 SECTION

JEEP WHIP ANTENNA



Extends to 82" • Closes to 14" • US Govt. antenna for mobile use on 2-6, 10, 11 meters • Removable mast, can base load for 20-40-75 meters. Solid brass, Type AN75D. Shipping Wt. 4 lbs.

Each **\$1.89**

3 for **\$5.00**

DISTRIBUTORS OF ELECTRONIC EQUIPMENT

Terminal Radio CORP.

85 CORTLANDT ST., NEW YORK 7, N.Y. • WOrth 4-3311

SENSATIONAL VALUE!

PIONEER Mobile
POWER SUPPLY



This 6 Volt Mobile Power Supply has one of the finest and most effective filter systems of any we have had the pleasure to offer. The top-quality Pioneer Dynamotor and rugged commercial construction, along with the low price adds up to **VALUE PLUS!** The filter section contains three husky iron core chokes and two RF chokes, all with seven oil condensers to effectively filter both A and B, and RF hash. There are absolutely no electrolytics used. Input and output are terminated in a standard 6-prong Cinch-Jones 5406AB socket. At the nominal input voltage of 5.5 Volts DC, it delivers 400 Volts at 175 Ma. **Continuous duty:** 250 Ma. at intermittent use. With storage battery up to snuff and husky A leads, output runs about 440 Volts. Base — 6" x 93/4" and 17" high.

ALL NEW — QUANTITY LIMITED **Special \$29.95**

Jones P406CCT Plug included

NEW
LOW PRICE!

Multi-Purpose LINEAR
6 Band



R.F. POWER
AMPLIFIER For SSB...CW...AM PHONE

Model No. 500W Here is a complete, ready-to-operate RF linear Amplifier with single control bandswitching for six amateur bands. This extremely stable output stage, operating in Class AB₂, provides very substantial power output with low grid drive. Excellent linearity and extremely low harmonic content in the pi network output circuit are other important features.

- SSB ... 250-300W P.E.P. Output • Pi network output for 50-300 Ohm loads • one knob bandswitching covering 10-11-15-20-40-80 meters with provisions for 160 • self-contained heavy duty power supply • excitation control • complete metering • screen protection • overload relay • completely free from parasitics or self-oscillation • excellent linearity on SSB or AM.

Complete with tubes...now reduced to only **\$339.00**

GONSET DE LUXE COMMUNICATORS

Model No. 3024—2 Meter	6 VDC/115 VAC	Net... \$ 229.50
Model No. 3057—2 Meter	12 VDC/115 VAC	Net... 229.50
Model No. 3049—6 Meter	6 VDC/115 VAC	Net... 229.50
Model No. 3058—6 Meter	12 VDC/115 VAC	Net... 229.50

Other GONSET Quality Items Regularly Stocked:

Model No. 3024—2 Meter VFO and Preamp	115 VAC	Net... \$ 84.50
Model No. 3022—MONOTONE		Net... 19.50
Model No. 3030—SUPER SIX CONVERTER		Net... 52.50
Model No. 3041—SUPER-CEIVER		Net... 119.50
Model No. 3000—De Luxe NOISE CLIPPER		Net... 24.50

And Many Others Write W2BUS for complete details



ROLLER-SMITH
HERMETICALLY SEALED METERS

Ruggedly built 21/4" meters precision engineered for accurate performance. Vacuum sealed, dustproof and moisture proof, unaffected by heat, cold, humidity. Made to JAN specifications by one of the best known names in meters. Attractive black finish steel case.

0-1 DC Milliamperes... \$3.95 • 0-200 Microamps... \$4.95

for a CAREER in communications
... to pass FCC amateur exams

LEARN CODE

and Theory

\$3.95
up

EASY,
FAST HOME STUDY!

(with 78 rpm phonograph records)
(UNBREAKABLE in normal use)

PASS COMMERCIAL AND AMATEUR CODE
EXAMS, AMATEUR THEORY EXAMS,
YOUR FCC LICENSE!

4 AMECO Courses Available:

No. 1 — NOVICE CODE COURSE. You get and keep 10 recordings (alphabet through 4 W.P.M.) plus typical FCC type code exams. Free instruction book on learning how to send and receive code the simplest, fastest way plus chart to check your receiving accuracy; plus an album; all for the low price of only ... \$7.95

No. 2 — SENIOR CODE COURSE. You get and keep everything given in the Novice Course exams, plus 10 recordings (alphabet through 18 W.P.M.), plus typical FCC type code exams for General class and 2nd class commercial telegraph licenses. All this for only ... \$12.95

No. 3 — COMPLETE RADIO THEORY COURSE. A complete, simplified home study theory course in radio covering the Novice, Technician, conditional and general classes, all in one cover — with nearly four hundred typical FCC type questions to prepare you for license exams. No technical background required. You also get, FREE, a guide to setting up your own Ham station, all in radio, for a low, low price of ... \$3.95

No. 4 — NEW ADVANCED-TV COURSE. For Novice operators for the amateur general class and second class commercial license tests. Contains 12 recordings (8 through 18 W.P.M.) PLUS the complete code book — PLUS typical F.C.C. code examinations for general and commercial tests. ALL for only ... \$6.95

No. 5 — RADIO AMATEUR QUESTION & ANSWER LICENSE GUIDE. A "must" if preparing for Novice, Technician or general class exams. Approx. 200 questions & answers (multiple choice type) similar to ones given on F.C.C. exams. Has 2 types of F.C.C. practice exams. Other 50¢ questions by subjects, easier to study. Low, low price of ... 50¢

FREE LITERATURE AVAILABLE
Sold at leading distributors
everywhere or write to
Dept. Q3

AMERICAN ELECTRONICS CO.
1203 Bryant Ave., New York 59, N.Y.



Founded in 1909
RADIO TELEPHONY
RADIO TELEGRAPHY
RADAR & TELEVISION

Courses ranging in length from 7 to 12 months. Dormitory room and board on campus for \$48.00 a month. The college owns KPAC, 5 KW broadcast station with studios located on campus. New students accepted monthly. If interested in radio training necessary to pass F.C.C. examinations for first, second, third, and fourth class telegraph and telephone, write for details. New Advanced-TV Engineering Course.

PORT ARTHUR COLLEGE **PORT ARTHUR**
TEXAS

Approved for G. I. training

ing the rectified current through a 50,000-ohm grid resistor. Plate voltage was 140, screen voltage 80. It should not be inferred that all crystals will follow this example; in fact, almost every crystal will show a slightly different curve. The peak activity and the frequency of oscillation at maximum pressure are usually close to the characteristics obtained with the crystal before it was modified.

If the crystal does not oscillate when first tried, turn the screw all the way up. Then turn it gradually downward until the crystal pops into oscillation. This will be approximately the high-frequency limit of oscillation. Check the frequency range by turning the screw until the oscillation stops. Do not go beyond this point as there will be danger of damaging the crystal.

This modification is not limited to the FT-243 type holder; however, larger crystals such as those found in FT-171, DC-34 and DC-35 holders will not show as much change as the smaller plates. In general, the smaller the plate, the greater the possible frequency range.

Don't be misled by the simplicity of this device. It does a smooth job of varying the frequency, while retaining the obvious advantages of crystal control. If the modification is made properly and the crystal is handled with care, your variable-frequency crystal should last for many years.

Code Practice Oscillator

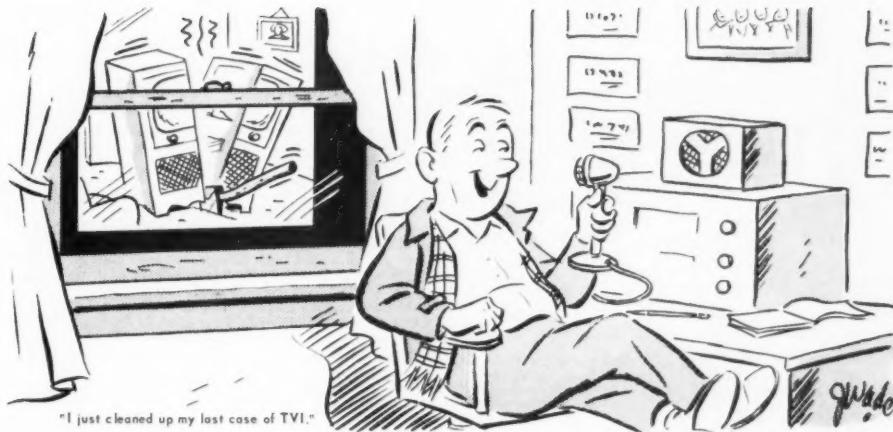
(Continued from page 25)

a level of about 1 volt input and there will be a keyed output of about 0.5 volts across 800-ohm phones. Note that the low-pass filter greatly attenuates frequencies at a multiple of the desired tone as these frequencies will also key the oscillator. This unit works satisfactorily with B voltages ranging from 12 to 120 volts. Should a code oscillator be desired, R_2 can be advanced to maximum and the B supply keyed, as in Fig. 2.

All in all, the simple code-practice oscillator is a versatile gadget. When all the use has been made of the unit in any of the above forms that the builder desires, about two dollars additional will permit construction of a regenerative receiver and purchase of a quartz crystal will then permit construction of a simple transmitter. Incidentally, should it be desired to finally make a transmitter out of the unit, a few pennies may be saved by the purchase of a crystal socket (such as the Millen 33102) which can be used as a phone tip jack on the code oscillator and receiver and as a crystal socket for the transmitter.

**SWITCH
TO SAFETY!**





Getting that new equipment is no problem when you deal with Walter Ashe. Cut your cash outlay to the minimum by taking advantage of Walter's "Surprise" Trade-In Allowance on your used (factory-built) test or communication equipment. Use the handy coupon; tell us what you have to trade and indicate what new gear you want. We will rush our money-saving "Surprise" offer to you by return mail. Don't delay. Get your trade-in deal working today.



NATIONAL NC-300. Less speaker. Net.....\$ 349.95



JOHNSON VIKING RANGER TRANSMITTER-EXCITER KIT
Net.....\$ 214.50
Wired and tested. Net..\$ 293.00



NATIONAL NC-98. Less speaker. Net.....\$ 149.95



HALICRAFTERS SX-100.
Less speaker. Net \$295.00

WRITE FOR FULL INFORMATION ABOUT OUR TIME PAYMENT PLAN

WALTER ASHE RADIO COMPANY
1125 Pine Street, St. Louis, Mo.

Rush "Surprise" Trade-In Offer on my

for (show make and model of new equipment desired)

Rush new free 1956 Walter Ashe catalog

Name.....

Address.....

City.....Zone.....State.....

Q-2-56

All prices f. o. b. St. Louis • Phone Chestnut 1-1125

Walter Ashe
RADIO CO.
1125 PINE ST. • ST. LOUIS 1, MO.

CONTINUAL RESEARCH AND ENGINEERING

EXPLAIN DOW LEADERSHIP

Model DKK



1000 WATTS
Length 4 1/2",
width 3 1/8".

Special connector protects your receiver from R.F. during transmission (Optional).

← Silent AC magnet prevents hum modulation of carrier—AC types guaranteed as quiet as DC.

Transmit contact-pressure over 75 grams, making the 1000 w. rating very conservative. Causes negligible change in SWR up to 100 Mc.

DKF2 rigid adapter for external chassis mounting, \$1.85



AC types (All volt.) Amateur net..... \$10.50
DC types (All volt.) Amateur net..... 9.50

See your distributor. If he has not yet stocked Dow Co-axial relays, order from factory. Send check or money order or will ship COD. Prices net FOB Warren, Minn. Shipping Weight 9 oz. Dealers' inquiries invited. Literature on request.

Add \$1 for external switch (Optional)

Add \$1 for special receiver protecting connector (Optional)

THE DOW-KEY CO., INC. WARREN, MINNESOTA

Distributed in Canada by Canadian Electrical Supply Co. Ltd.
275 Craig St., W. Montreal, Quebec

Proven Performance



MODEL
CD-2
FCDA
APPROVED



DOUBLE CONVERSION RECEIVER PLATE MODULATED P.P. FINAL

- Available for 2 Mtrs. or 6 Mtrs.
- Designed for CD, Fixed or Mobile
- Your complete CD station

MADE FOR TOPEKA, KANSAS CD
AND TOWN OF COVENTRY, R. I.

SONAR A complete resume available
on request to CD Division
RADIO CORP
3050 WEST 21st ST., B'KLYN, N. Y.

How's DX?

(Continued from page 52)

galena crystal." . . . Oceanigrams via WGDXC and WGYY: VK1ZM departs cold Macquarie Isles for more element VK2 climes. . . . VP2VB/P is well heard on 15 and 20 on *Yasme* shipboard in the Tahitian vicinity. . . . The biggest noise from Western Australia henceforth doubtless will be VK6MK with 85-foot-high Telrexes for 10, 15 and 20. . . . ZL1PA withdrew from ZL2GX's Kermades enterprise in favor of ZL2CU. When ZL2s GX and CU pull off this stunt the New Zealand navy likely will share credit, for other Kermades-bound water transport is unavailable. . . . VR6AC tells the NCDXC gang he'd be more active if generator fuel wasn't such a scarce commodity on Pitcairn. Floyd's high-priced jenniejuice dribbles in all the way from Balbous, C. Z.

Europe—Monaco DX-band workability is enhanced by newly licensed 3A2s BN BP and BQ. Respectively, they are K2JCS-F7ER, K9BGZ-F7AM and K6CDT-F7CZ, all members of the Yanks-in-France Le Rochelle Radio Club. . . . HB9ROP leaked to K2BZT that he plans more Liechtensteining in month or two (HB1OP/HE). . . . W9HOP and XYL have been touring the Continent. W2ESO wouldn't be greatly surprised if Larry tried his hand as an M1 HV or 3A2. . . . W8KYU's friend E1BC, a regular Sunday fixture on 14,000-ke. c.w., may leave the old stand for a joyful jab at 15 meters. . . . Germany-stationed WN5KNE is in on the radio club plans of DLs IBZ 4CCB 6EN and 6EQ at Bad Kreuznach. Bob knows little German but ham radio is ham radio, be the QTH Texas or the Rhine valley. . . . F9TB is radio aboard a Mediterranean oceanographic vessel chartered by Monaco's famed science museum. F9LT/MM is the ship's ham band call. HE9RDX of USKA reports W1MXA (ex-IIIY-CN8CM) doing radio duty aboard a U. S. minesweeper plying the same waters. . . . WGDXC has DL3AO preparing a DXpedition to, possibly, Luxembourg. LXs always have been scarce on c.w. and not too abundant on voice. . . . NCDXC sources learn that ART (Italy) schedules a yearly DXcursion to San Marino, an event usually occurring in midsummer. Also, OK1MB speaks of future Albanian ham activity but isn't too specific.

Hereabouts—VE7QF nails down this VE8N business: "The series VE8N- have been set aside for allocation to amateur stations located on board Royal Canadian Navy ships; the series VE8M- for stations on board ships of Canada's merchant fleet. As the call itself indicates maritime-mobile operation no suffix MM is used. The order

(Continued on page 124)



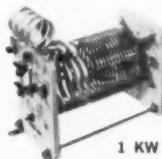
OQ5BI hits 10 and 15 heavily, and 20 occasionally, with this layout in Leopoldville. At left on the op table an 80's Class AB₂ modulator perches atop a power-supplies cabinet; at right Gerard's handswitching 6146 rig rests upon a homebrew double-conversion super designed by F9AF. OQ5BI, now at the 110-country mark on phone, uses a pair of three-element rotaries mounted on the W1IYI elevator mast described in April, 1952, *QST*.

Make the heart
of your successful operation
"DX AMATEUR EQUIPMENT"
in stock at
Valley Electronic Supply Company

Join the "honor roll" hams who work 'em world wide with DX equipment. Order from us now in confidence—we have complete stocks of all receivers, transmitters, test equipment and components. Get our high trade-ins and liberal credit terms. We ship everywhere.

Barker & Williamson, Inc.

B&W



**1 KW PI-NETWORK
TANK COIL**
Amateur Net: \$35.00



MODEL 5100-B XMTR.
Amateur Net: \$475.00

**MODEL 51SB-B SSB
GENERATOR**
Amateur Net: \$279.50



MATCHMASTER
Amateur Net: \$47.50



Collins



KWS-1 XMTR.
Amateur Net:
\$1,995.00



E. F. JOHNSON COMPANY



KW "MATCHBOX"
Amateur Net:
\$124.50



**VIKING
ADVENTURER KIT**
Amateur Net:
\$54.95

**VIKING RANGER
XMTR.**
Amateur Net:
\$293.00



1 KW PWR. AMPL.
Amateur Net:
\$1,595.00

The Sign
of Quality
Equipment
for
Amateurs
& Industry



VALLEY Electronic Supply Company

1302 W. Magnolia Blvd., Burbank, Calif., Phone Victoria 9-4641
17647 Sherman Way, Van Nuys, Calif., Phone Dickens 2-5143

Ask about FREE novice classes at our stores: W6LTY & W6QJI instructors

Some
Prices
Slightly
Higher
West of the
Rockies

mosley

TELLS AT A GLANCE!

- If You Have Worked Station Before!
- If So, The Operator's Name!

A Fast, Easy-to-use Reference that REMEMBERS for you!

just \$1.00

At Your Favorite Ham Equipment Supplier!

Mosley Electronics, Inc.

6422 ST. CHARLES ROCK ROAD ST. LOUIS 14, MISSOURI



MORE SIGNALS PER DOLLAR
From Money Invested in an Antenna

Self Supporting
STEEL TOWERS
For Rotary Beams, FM, TV

You can erect this tower yourself. Just dig four holes, set anchor posts in place, bolt the pieces together. 5 1/2 ft. ladder sections make it easy to work higher as tower goes up. It's a lot of fun to build your own tower — and saves you money, too!

ATTRACTIVE — NO GUY WIRES!

- 4 Post Construction for Greater Strength!
- Galvanized Steel — Will Last a Lifetime
- SAFE — Ladder to Top Platform
- COMPLETE — Ready to Assemble
- Withstands Heaviest Winds

SMALL DOWN PMT.—EASY TERMS

Width of
Base Equal
to 1/5 Height

Vesto Towers are available in a wide range of sizes to meet requirements of amateur, commercial, and alike. Note the low prices for these quality lifetime towers: 22'-\$104, 28'-\$127, 33'-\$149, 39'-\$182, 44'-\$208, 50'-\$239, 61'-\$339, 100'-\$895.

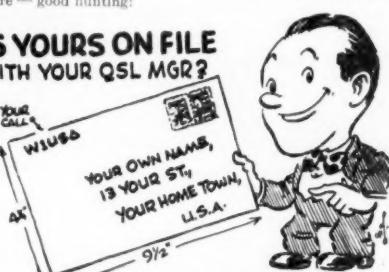
WRITE TODAY
FOR COMPLETE
FREE INFORMATION
AND PHOTOGRAPHS

VESTO CO., Inc.
20th and Clay
North Kansas City, Mo.

QSL index

authorizing operation aboard naval ships was dated May, 1954, and to date only two stations are on the air. . . . The licenses are issued as club licenses; therefore any licensed amateur aboard [each particular] ship is permitted to use the club station, signing the club call. Only one license is issued each ship and these stations are subject to all the regulations that apply to the ordinary Canadian amateur, plus additional ones imposed by the Navy and the captain of each ship. . . . There is no change in regulations regarding ordinary VE mobile operation. . . . The call is still the operator's station call, slant, and a number indicating the call area he is operating in. . . . W2COT has possible bad news, for VQ QSL aspirants: "I understand that on the night of November 9, 1955, the main post office and its contents at San Salvador were destroyed by fire." . . . ARRL W9 QSL Bureau Manager W9CFT is hampered DXtensively by Green Bay, Wisc., Channel Two emanations. Although TVI no longer is the ogre it was a few years ago, fringe-area DX chasers still are hard put where Channels Two and Six are involved. . . . Ohio Valley ARA's *Ether Waves* lists its local DX champs on a band-by-band basis. W8JIN leads the flock on 75 phone (22 countries), 40 c.w. (133), 40 phone (28), 20 c.w. (242), 20 phone (129), 15 phone (102), 15 c.w. (81) and 10 c.w. (86). W4KVX controls the situation on 160 c.w. (4 countries) and 80 c.w. (65). W8ELB holds claim to leadership on 11 phone (14 countries) and 10 phone (82). WSEV is boss on exclusive 11 c.w. (13 countries). W8JIN's aggregate 931 hand-countries is tops for OVARA. How does your club stack up by this yardstick? . . . W1ONV, ex-8RY-9FO and *Call Book* editor from 1927 to 1936, is curator of birds of the Chase Wild Animal Farm at Hingham, Mass. Art also plucks a feather from the DX Bird on 20 c.w. now and then. . . . TG9RR was put through paces at last December's Guatemalan Boy Scout Camporee. Special QSLs are en route to confirm QSOs garnered on 7 and 14 Mc. . . . The W9-DXCC clan, chairman W9EUE presiding, is considering publication of a DX bulletin on a monthly basis. . . . CO2GO calls attention to the RCC (Cuba) DX award labeled CUBA. Confirmation of a certain number of CM-CO QSOs is necessary, the required total depending on an applicant's geographical location. It's a shnazzie sheepskin — write CO2GO of RCC's awards committee for up-to-date details on rules. . . . Surinam's PZ1BS daily becomes more popular with his rockbound 6V6-6L6-807 25-watter, folded 14-Mc. dipole and modified all-band s.w.b.c. 6-tuber. He writes W1OJR that only N. Mex., Utah and Vt. remain unworked after two months of activity. W/K/VE pursuers demand continual attention but Am has squeezed in contacts with over thirty countries on all continents. . . . Top performers of the new Willamette Valley (Ore.) DX Club are W7s HXG GBW ENW and AC with 209, 194, 176 and 160 countries confirmed. W7s HXG and HGC head up the phone-only group with 128 and 100 accounted for. This via NCDXC's *DXer*. . . . Only very few days until our DX bands throb with the 22nd ARRL International DX Competition. *QST* carried the detailed announcement last month and you'll find a reminder boxed in this issue. There are several approaches to these annual DX jamborees: (1) strike out for score; (2) concentrate on new countries and call your shots; and (3) focus your attention on certain countries to clinch some of those foreign-society awards you're almost ready to apply for. If the first proposition strikes your fancy you can get a line on your competition by perusing W1ZDP's statistical study of last year's affair beginning on page 60, October 1955 *QST*. You take it from there — good hunting!

IS YOURS ON FILE WITH YOUR QSL MGR?



(See page 140 this issue)

4 top receiver buys!

...and you'll do better on trade-ins, too!

Terrific Trade-Ins—As liberal as anyone in the country... and yours may be worth more at Burghardt's. Trade-ins usually cover down payment on your new gear.

10% Down—Easy Terms
—10% down lets you "take it away." Up to 18 months to pay on balances over \$200. Burghardt's financing saves you money—adjusts terms to your budget. All time payments based on local bank rates. Full payment within 90 days cancels interest.

Speedy Delivery—Personal Attention—No order too large or small for personal attention. All inquiries acknowledged and orders processed day received.



Satisfaction Guaranteed
or your money refunded
after 10 day trial.

Designed for the future, these 4 receivers are up-to-the-minute in design and performance... engineered for SSB as well as other modes of reception. Remember, as little as 10% down and one of these fine units can be yours!

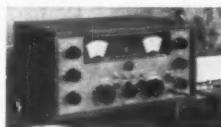


NATIONAL NC-300—Dual conversion—better than 50 db primary rejection 160 to 1 1/4 meters. More than 60 db secondary image rejection. Extra long slide rule dial. Super selectivity—giant, easy-to-read "S" meter. With tubes.

\$34.95 DOWN \$19.07 per mo. for 18 mo.
NC-300TS Speaker Amateur Net \$17.00
300XCU-2 Crystal Calibrator Amateur Net \$19.95
6, 2, 1 1/4 Meter Converters Amateur Net \$39.95 Ea.

NEW! GPR-90—15 tube dual conversion superhet receiver for .54 to 31 mcs. 6 accurately calibrated bands with full electrical bandspread. AM, CW and MCW. Excellent sensitivity and selectivity—highly effective noise limiter—"S" meter. With tubes.

\$39.50 DOWN \$21.52 per mo. for 18 mo.
Matching Speaker Amateur Net \$16.00



SX-100 RECEIVER—Loaded with features: Selectable sideband operation—"T"-notch filter—50 kc highly selective i.f. system—crystal controlled second conversion oscillators—built-in crystal calibrator.

\$29.50 DOWN \$16.07 per mo. for 18 mo.
R-468 Speaker Amateur Net \$17.95

COLLINS 75-A4—Excellent selectivity—covers 160 thru 10 meter bands. Dual conversion—crystal controlled converter—"drift-free" VFO. Sensitivity: 1.0 microvolt for 6 db signal-to-noise ratio with 3 kc bandwidth. Includes noise limiter and crystal calibrator. With tubes.

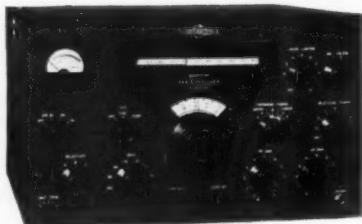
\$59.50 DOWN \$24.99 per mo. for 24 mo.
270-G Speaker Amateur Net \$20.00
312A-1 Speaker Control Amateur Net \$37.50



TOP TRADE-INS—We have hundreds of standard brand pieces of equipment in our trade-in department and prices are realistic! Write for current bulletin.
NEW CATALOG—The most up-to-date presentation of amateur equipment available. Chock full of gear and accessories. Write for your free copy today!

Burghardt R A D I O S U P P L Y
P. O. Box 746, Watertown, So. Dakota • Phone 749

The 75A-4



Designed Expressly for Amateur Operation on the 7 HF bands

The Collins 75A-4 receiver retains time-proven features of earlier 75A series, plus AVC on SSB and CW, separate detectors for AM and SSB. Pass band tuning, rejection tuning, superior selectivity. Many other outstanding features.

Send for complete details in Bulletin 5M-3-JPC

SELECTRONIC SUPPLIES, INC.

Radio and Electronic Supplies

1320 Madison Ave., Toledo 2, Ohio, W8GDE, Mgr.
803 South Adams St., Peoria 2, Ill., W9YYM, Mgr.

THE ANSWER TO
A HAM'S DREAM

EZ WAY TOWERS

CRANK UP AND DOWN
TILT OVER



It's the original tilt-over tower. Easy to install and adjust antennas. E-Z Way manufactures 22 different types of towers from 40 ft. to 120 ft. including crank-up towers that can be attached to side of building and lay-over towers for flat roof installation.



Write for free Ham Tower Catalog. Dept. HT

E-Z WAY TOWERS Inc.

P. O. Box 5491 • Tampa, Fla.

Correspondence

(Continued from page 61)

ember issue of *QST*. Perhaps the discovery that the extra pages did not mean more technical material brought disappointment to some. In my own case this was not so. I was well pleased to see for the first time what the first issue of my favorite radio journal looked like. . . .

— Elmore J. Fitz, W1DGT

6730 N. Temple City Blvd.
Arcadia, California

Editor, *QST*:

Congrats on December *QST* with reprint of 1915 magazine. Am very interested in history of amateur radio but have never seen early issues.

— Frank Q. Newton, Jr., W6SYG

1440 N. Dearborn Pkwy.
Chicago 10, Illinois

Editor, *QST*:

. . . Congratulations on your fortieth anniversary issue of *QST*. My husband (W9KGK) and I — and thousands of others, I am sure — thoroughly enjoyed the reprint of the first issue. My, how you've grown! . . .

— Evelyn M. P. Meskan

P. O. Box 283
Warrenton, Va.

Editor, *QST*:

. . . It is *some* issue! That trick of including *QST* No. 1 was a good one. FB. Makes a fellow proud of his ARRL to get a magazine like this December issue! Cover was impressive, too. . . .

— Ev Battley, W4IA

25 Chittenden Ave.
New York 33, N. Y.

Editor, *QST*:

Nice work on the 40th anniversary issue of *QST*! It brings back many pleasant memories and I hope that you will reprint other early issues from time to time.

— Leon L. Adelman, W2AFS

1907 Clark Street
Des Moines 14, Iowa

Editor, *QST*:

Congratulations on publication of 1915 issue of *QST*. I still have my own CZ license for that year 1915.

— A. Lee Chamberlin, W0CZ

21 Morin Ave.
Keene, N. H.

Editor, *QST*:

Congratulations on fortieth anniversary issue of *QST*. It is a fine example of amateur radio over the years.

— Dana Parks, Jr., W1BY'S

SERIOUS AMATEUR

8136 Wortser Ave.
No. Hollywood, Calif.

Editor, *QST*:

This 75 meter "politician" of many years standing seems to detect a note of "sour grapes" in one letter in the November issue, and a sort of "grandfather clause complicity" in another, both on the subject of the Extra Class license.

Granted, the ticket is hard to get. I hold a 1st phone commercial, and consider my Extra Class a greater accomplishment. But the point is that it *has* been traditional in amateur radio for a man to work up to something better as he progresses.

We seem to have retained this tradition the wrong way. Instead of raising our sights and going along with the Extra Class idea, we have instead started lower and worked up to where we were all the time.

Now, the General Class men who are content to buy their commercial rig, plug it in, and chew the rag, have all the privileges they could possibly feel entitled to, so WHY NOT have something for the serious amateur who pursues his hobby for something more than shooting echo chambers and train sound effects across town?

Let's have the 14300 to 14350 and 3600 to 3700 for Extra

(Continued on page 128)

Wanted!

COMMUNICATION & RADAR PERSONNEL

AT ALL LEVELS AND IN ALL FIELDS OF ELECTRONICS

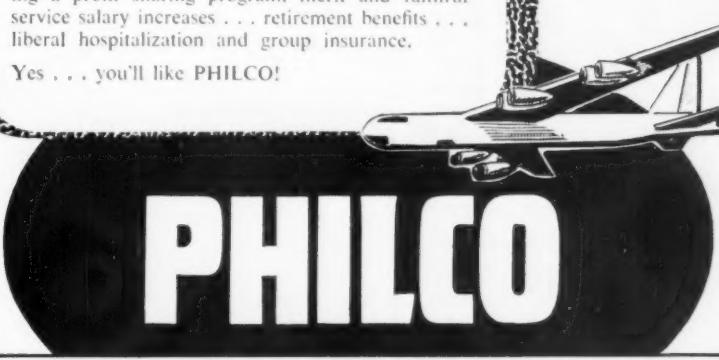
Immediate Openings!

Our assignments cover an interesting variety of BOTH Commercial and Government operations to be serviced on a long range basis. Needless to say — they offer challenging opportunities and employment security to those who possess the ability and/or educational background necessary to the DESIGN, MAINTENANCE and/or INSTRUCTION of others in the fields of COMMUNICATION, RADAR and SONAR EQUIPMENT.

In addition to TOP PAY, commensurate with your ability to do a *better than average job*, PHILCO has many levels of SPECIAL ASSIGNMENT BONUSES . . . valuable company benefits including a profit sharing program, merit and faithful service salary increases . . . retirement benefits . . . liberal hospitalization and group insurance.

Yes . . . you'll like PHILCO!

Why Not JOIN
The PIONEER
In The
SERVICING of
ELECTRONIC
EQUIPMENT?



PHILCO

THE WORLD'S *Largest FIELD SERVICE ORGANIZATION*

For Detailed Information On These *New* Openings—Write

PHILCO TECHREP DIVISION

22nd & Lehigh Avenue,

Philadelphia 32, Pa.

Shakespeare **WONDEROD**

FIBERGLASS whip antenna

Excellent Insulation Shorter Resonant Length
 Will Not Corrode High Impact Strength
 High Flexural Strength Will Not Take a Set
 Light Weight

Made by the pioneer manufacturer of FIBERGLASS fishing rods. Industrial applications solicited

— with 3/8-24 tnd chrome-plated brass fittings

Whip: 54 to 59", \$5.75 - 60 to 90", \$6.95
Base Extension: 350" dia. - 18", \$3.95
.350" dia. - 36", \$4.70
.500" dia. - 36", \$5.82
 prices amateur net

Tech. Rep. Inquiries Invited

If your jobber can't supply you, write

COLUMBIA PRODUCTS CO.
 P. O. BOX 5207 COLUMBIA, SOUTH CAROLINA SUBSIDIARY OF SHAKESPEARE CO.



Revolutionary System of Audio Control

THE ULTRA MODULATION UNIT

- ✓ Use MORE Audio Power than CarrierPower without Overmodulating!
- ✓ No Splatter — No Distortion!
- ✓ Punch Thru QRM!
- ✓ Simple to Install On Any Plate
- ✓ Modulated Rig — Only 3 Leads to Connect!
- ✓ Low in Price!

Ultra Modulation Company
 Red Bank, N. J.

For Information Folder, write to:

Class phone, and 7100 to 7150 c.w., exclusively for Extra Class. You'll see — make something to shoot for, and there'll be plenty of the boys shooting. What a letdown, as change after change came through in the last few years, as possibility after possibility for Extra Class privileges went down the drain, as everything was handed on a silver platter to the lazy men.

— Richard Blanchard, jr., W6UYG/QYR

WARM FEELING

1542½ — 2nd Avenue
 Los Angeles 19, Calif.

Editor, QST:

Due to a severe and prolonged illness I was unable to fulfill operating time requirements for renewal of my amateur radio license. FCC workers certainly put themselves out to keep me from losing my ticket. Correspondence between the FCC and me covered a period of several months. To save me personal embarrassment, the FCC even went so far as to write to my doctors (to whom I am so financially indebted) for the necessary affidavits.

I know that the relating of this incident gives all the guys and gals engaged in ham radio who read this the very warm feeling toward the FCC that the experience itself gives to me. And so long as that good feeling exists, it's bound to help make better operators out of all of us.

— Felix F. Januss

PIRATE

Intelec S. A.
 Ave. Este 2
 Caracas, Venezuela

Editor, QST:

I would greatly appreciate your assistance in the apprehension of that lowest of skunks, the call letter pirate. Too lazy to take the FCC examination and get his own license, he picks out the call of someone who is not currently on the air, and uses it for a while.

Today I received a QSL card from W3ZIR/3, claiming a contact with W2EWP on June 26, 1955, on 7 Mc. phone. I have been in Venezuela since December 1954 and my equipment is in a storage warehouse awaiting my return to the States. The fact that I am overseas and not on the air was brought to the public attention in connection with an article of mine which recently appeared in another radio magazine. It is apparent that someone who read the article decided that mine would be a good, safe call to steal for a while.

I have also written to the FCC today about this, and I have told them that I will advise them in writing when I return to the States and again resume operation of W2EWP.

— Paul H. Lee, W2EWP

NEW DIAGRAMS

Arrayan 1767
 Montevideo, Uruguay

Editor, QST:

Just a line to express my appreciation for the good stuff you get out in QST and to let you know that I like the modernized diagrams. At first it took me a little longer to figure circuits out, but now I find them easier to read at a glance than the previous ones.

— Kenneth Indart, CX2BP

INTERESTING WORK

4101 Hughes
 Amarillo, Texas

Editor, QST:

In regard to the W2JTJ "Budget 7 Mc. Vertical" in the November issue of QST, the idea appealed to me immediately and I set out to obtain the principal materials: namely 82 beer cans. However, only 7 empty cans were located and since the project hinged on these particular type cans, I ordered the remaining 75 from a local distributor of this type of antenna material.

Said material was delivered this morning and at present I am removing the contents in order to properly prepare the cans for soldering. The process is rather slow but it is most interesting work. I now have about a dozen cans

(Continued on page 130)

SENSATIONAL MICRONTA

MULTI-TESTER SALE!

ALL ASTONISHINGLY LOWER PRICED!



\$7.79

- 250 ua 4000Ω/v DC
- 500 ua 2000Ω/v AC



\$11.95

2000Ω/v AC, DC!
QUALITY 160 ua METER!

ALL WITH SILVER SWITCH CONTACTS!

Best buy in America! MODEL R-600 — ultra compact $3\frac{1}{2} \times 4\frac{3}{4} \times 1\frac{1}{2}$ " multi-range universal circuit tester of pocket size, equipped with a 175 ua jeweled meter of high sensitivity. Micronta RETMA guarantee, plus exclusive silver switch contacts, rubber test leads. Ranges: AC 10, 50, 250, 500, 1000 volts — 2000 ohms per volt. DC 10, 50, 250, 1000 — 4000 ohms per volt. DC current: 250 ua, 10 ma, 250 ma. Resistance: 0-10K, 0-1 meg. Decibels: -20 to +22, +20 to +36 db (Odb-0.775v-600 ohms). Complete with leads, batteries, bakelite case. Imported to save you money, MICRONTA-branded to assure you of Radio Shack quality! Ship. wt. 2 $\frac{1}{2}$ lbs. Order No. R-600 Q..... Only \$7.79

If made in this country the MICRONTA R-4500 would cost at least TWICE Radio Shack's exclusive low price! Sensitive, accurate, well-built, and featuring silver switch contacts and rubber leads. 18-position single rotary knob selected ranges: AC 10, 50, 250, 500, 1000 volts — 2000 ohms per volt. DC 10, 50, 250, 500, 1000 — 2000 ohms per volt. DC current: 500 ua, 2.5 ma, 25 ma, 250 ma. Resistance: 0-1K, 0-10K, 0-100K, 0-1 meg. Decibels: -22 to +50 db (Odb-0.775v-600 ohms). Complete with batteries, leads, bakelite case, magnificent 160 ua jeweled meter, MICRONTA-RETMA guarantee. Compact pocket size: $3\frac{3}{4} \times 5\frac{3}{4} \times 2$ ". Ship. wt. 4 lbs. Order No. R-4500 Q..... Only \$11.95



\$17.95

NOT a kit, like all Micronta V.O.M.'s it features silver switch contacts, rubber leads, standard RETMA guarantee. From its 3" full-scale jeweled .45 ua meter to its sloping front bakelite panel, this is truly the meter buy of the year. Ranges: AC 10, 50, 250, 500, 1000 volts — 8000 ohms per volt. DC 10, 50, 250, 500, 1000 volts — 20,000 ohms per volt! DC current: 50 ua, 2.5 ma, 25 ma, 250 ma. Resistance: 0-5K, 0-50K, 0-500K, 0-5 meg. Decibels: -20 to +5 db, to +5 to +22 db (Odb-0.775v-600 ohms). Single rotary range 18-position selector! Complete with leads, batteries, sloping front bakelite panel. An added feature is its extremely compact size of $3\frac{5}{8} \times 5\frac{3}{4} \times 2\frac{3}{4}$ ". Imported to save you many, many dollars! Ship. wt. 4 $\frac{1}{4}$ lbs. Order No. R-4002 Q..... Only \$17.95



Mail Orders: add est. postage; no C.O.D.

RADIO SHACK

167 Washington Street, Boston 8, Massachusetts
and 230-234 Crown St., New Haven 10, Conn.



HARRISTAH

Presents a new concept in VHF transmitters

- 12 watts to a 5763 final
- Internal antenna relay and s.pdt contacts for receiver disabling
- New Neon indicators for constant monitoring and tuning
- Mike: carbon or xtal
- Real Audio punch
- 6 or 12 volt operation
- Push-to-talk provisions
- Very low power drain
- Uses low cost 8mc crystals
- Easily accessible crystal
- 50 or 72 ohm output
- CW or phone operation
- Compact construction
- Price \$69.50 Amateur Net, with tubes

Ask your dealer or write to Dept. Q at

HARRISTAH LABORATORIES

474 East 2nd Street, Brooklyn 18, N.Y.

BARGAINS in QUALITY CRYSTALS BY MANUFACTURER

AMATEUR BAND CRYSTALS

In FT243 Holders

3500 to 4000 KC	7000 to 7300 KC
8000 to 9000 KC	
Your choice of frequencies ± 1 KC	

3 for \$2.00 10 for \$6.00

OTHER FREQUENCIES

In FT243 Holders

6000 to 7000 KC	7300 to 8000 KC
± 1 KC your specified frequency	

50¢ each

SSB FILTER CRYSTALS

New stock—Gold plated—No WW2 surplus
54th and 72nd harmonic type in FT241A holders
All channels 370 to 480 KC

50¢ each

Every crystal guaranteed
Minimum order \$2.00 NO C.O.D.'s
Add 5¢ postage per crystal

CRYSTALS INCORPORATED
ODELL, ILLINOIS

soldered togdeed and the posibilities of thesh cans seem innumerable. The projek is so enjoyabole I have plansh for a 40 meater beem an a 10 meater grown plane and a 20 meater cuberal quad an oh jush losh and losh of otherens.

I always had a whole bunch of trubble fixin antennas an I sure wanna thank Mr. W2JFJ and Mr. Editer for letting me know about these fine type antennas. Shur wants thankem. Jush wanna say lesh have more thesh wonderful storis. Itsu wonnerful antenna an I sure gonna work lotsa DX with it. Ham radio shure ish a fine hobby. Hi Hi Got tget bizz fore the exYL gesh back. Thanks to all my of fransh.

— R. R. Lacy, W5DXZ

EX-BOOSTER

R.F.D. #1
W. Springfield, Ohio

Editor, QST:

I've been a booster of ARRL for a good many years but I want to tell you right now that I don't intend to renew my membership. I've been waiting for you to do something about the Sweepstakes rules and I'm plenty sore about it. The SS Contest is unfair.

Why should the best operators always win? Those fellows spend weeks, even months, fixing up their stations. Then they put up new antennas. They figure out which bands pay off at certain times and operate during the best hours of the permitted 40. Why, I hear that some of those jerks even practiced sending on a code oscillator so they could operate faster and better.

If they want to do those silly things, let them. But it's not fair to the rest of us. We—and there are more of us than you may think—want to be taken care of by ARRL. That's why we belong to the League, not to get QST. Why should I have to work fast break-in or push-to-talk in the SS? Throwing four switches always worked for me. Why must I put up good antennas to compete with those eager beavers when my single wire still loads? As for operating, I'll do mine when I feel like it, maybe when I'm tired of TV for the evening, and when I'm on c.w. I'll use my good old bug swing. It's not my fault if the contest is full of lids who can't even get my call right.

The only fair way to run this contest is to give everyone an equal chance to win. The way to do this is by the intelligent use of multipliers. I have given this a great deal of thought and have now figured exactly how the multipliers should be used. Here's how you should do it:

Multiplier Earned by

1.5	C.w. operator not able to send over 18 wpm.
1.5	C.w. operator who can "copy in his head" but can't write it down correctly.
1.5	Phone operator who really projects his personality.
1.5	Phone operator having too much Queen Roger Mary.
1.5	Station throwing two or more send-receive switches.
1.5	Station with only one antenna.
1.5	Station using only one band.
1.5	All west coast stations because they expect it.
1.5	All east coast stations because they don't.
1.5	All others because they aren't on either coast.

I brought this up at the last radio club meeting and it sure was a surprise to see how dumb those guys were. When they didn't agree with me it burned me up. I told them what I'm telling you now—they could go along with me or I'd resign.

I'm glad I don't belong to that radio club any more.

— A. L. Worrom, 8ACF

NEED PARTS?
CURLE RADIO SUPPLY

439 Broad St., Chattanooga, Tennessee
406 Meridian Street, Huntsville, Alabama

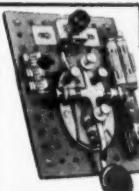
FREE! LAFAYETTE CATALOG



132 PAGE ELECTRONIC CATALOG

Packed with the largest selection of Electronic Radio and T.V. Parts, and equipment. PA, Hi-Fi, systems, tubes, antennas, Transistor Kits, parts and components. Test Equipment, now build your own kits, tools, books, Microscope, drafting equipment, Binoculars, Telescopes, All Radio, TV and Home supplies—**ALL AT GREAT SAVINGS**—For the economy minded serviceman, dealer, engineer and technician **CHUCK FULL OF BUYS! SEND FOR YOUR FREE COPY TO-DAY.**

Just a few of Lafayette's Values



TRANSISTOR CODE PRACTICE OSCILLATOR KIT

For those interested in mastering the international code, an audio tone oscillator is essential. The circuit of this transformer coupled oscillator has the ability to excite the neon glow, the signal strength of the vacuum tube, and requires only two penlite cells for power. The oscillator can be used for solo practice, or two may send and receive with the same unit. Kit comes complete with all parts required—Transistor, Resistors, Condensers, Masonite Board, etc., and Schematic Diagram.

KT-72 Net 2.99
Canner EGI—Single Headset Net 1.13

2 TRANSISTOR POCKET RADIO KIT

Packed into a $2\frac{1}{4}'' \times 3\frac{1}{2}'' \times 1\frac{1}{4}''$ plastic case. This Two Transistor pocket radio kit is made using a vacuum tube oscillator/detector circuit with transformer coupled audio stage, gives you high fidelity entertainment with built-in volume control. Kit comes complete with two transistors, crystals, diodes, resistors, antenna, audio transformer, resistors, condensers, plastic case, etc. Including schematic and instructions. KT-65A. Complete Kit less earphones.

KT-65A Net 11.90
MS-260 Net Super Power Dynamic Earphone, ideal for Transistor Circuit Imp. 8000 ohm, D.C. 2000 ohm 3.95



HIGH SENSITIVITY 20,000 OHM PER VOLT DC 10,000 OHM PER VOLT AC MULTITESTER

35 in 3 METER SILVER CONTACT SELECTOR SWITCH 1% PRECISION RESISTOR

LOOK AT THESE FULL SCALE RANGES!
D.C. VOLTS: 0-6; 0-30; 0-120; 0-600; 0-1200; 0-6000 Volts—RESISTANCE: 0-10K;
0-500K; 0-5M; 0-50M; 0-500M. MAGNETIC: 0-600 Milliamperes—0-6; 0-60; 0-600 Milliamperes—0-6; 0-60; 0-600 Milliamperes—DECIBEL: 20 to +17 dB—
0.774V—CAPACITY: .0001 .001 .005 .15 mfd—INDUCTANCE: 20-
2000 millihenry—OUTPUT RANGES: 0-6; 0-30; 0-120; 0-600;
0-1200 Volts

The new Lafayette high sensitivity Multimeter is a complete instrument (not a kit). In addition to its unusual sensitivity of 20,000 OHMS PER VOLT on D.C. AND 10,000 OHMS PER VOLT ON AC, and its extra wide ranges, it is compact, it is packed with features that would make it a choice instrument for the amateur and much if made in this country. Uses 1% precision resistors, silver contacts on selector switch. 35 in 35. KW-30A

In lots of 3, each 19.25 Singly, each 19.95

STUDIO CRYSTAL MICROPHONE

- DUAL CRYSTAL CARTRIDGES
- ALL DIRECTIONAL
- FINE QUALITY
- HIGH OUTPUT

Here is a microphone with a 360° pickup, and the added power and sensitivity of two individually shock mounted and phased crystal cartridges. This arrangement assures you of maximum pickup from all sides. Swivel mounted to give fuller flexibility. Case is chrome plated. Standard $\frac{5}{8}''$ -27 thread. Overall size 7" H x 3" W complete with 4 ft. cable. Shpg. wt. 4 lbs. PA-17—

In lots of 3, each 6.95
Singly, each 7.25



6.95
ea. in lots of 3.

single, each
7.25



SLIM HIGH OUTPUT DYNAMIC MICROPHONE

Reg. Price ~~47.50~~

A pencil-slim design, high output PA Dynamic microphone of exceptional quality, at a price that is $\frac{1}{3}$ of the price of any comparable microphone. A high output microphone, size $1\frac{1}{2}''$ dia. $60-10,000$ cycles. Omnidirectional, tiltable head. Switch on side gives choice of either high impedance (50,000 ohms) or low impedance (250 ohms). Instantly removable bracket permits either on stand or as hand mike. Features exceptionally mounting strength. Case case with satin chrome finish. $\frac{5}{8}''$ -27 thread. Accoustically-treated grille head, 8" long; $1\frac{1}{4}''$ barrel diameter. Shipping weight 2 lbs.

In lots of 3, each 9.25
Singly, each 9.95

CRYSTAL MICROPHONE

COMPARE IT WITH ANY MIKE AT 2 TO 3 TIMES THE PRICE

A quality crystal Microphone for PA, telephone, etc. Frequency response 30 to 10,000 cycles. Output level 52 db. Provides ample output for low gain amplifiers. Complete with 3 ft. of shielded cable. Shpg. wt., 3.475 lbs.

PA-24—In lots of 3, each ... 3.95 singly, each 4.25



TRANSISTOR TYPE 2N107


F-N-P \$1.25

RAYTHEON TRANSISTOR

CK722
P-N-P
99c


Lafayette
Radio
DEPT. VB

Include postage
with order

NEW YORK, N.Y. 100 Sixth Ave.
BRONX, N.Y. 542 E. Fordham Rd.
NEWARK, N.J. 24 Central Ave.
PLAINFIELD, N.J. 139 West 2nd St.
BOSTON, MASS. 110 Federal St.

**LAFAYETTE RADIO
100 SIXTH AVE., NEW YORK, N.Y.**

Send FREE 132-Page Lafayette Catalog

Name _____

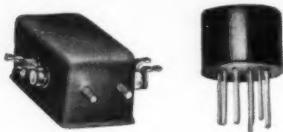
Address _____

City _____ Zone _____ State _____

Evans **RADIO**
P.O. BOX 312 CONCORD, N. H.

FREED

PULSE TRANSFORMERS



Applications of the newest developments in materials and methods, plus extensive research, have made possible the design of highest quality units. Freed pulse transformers feature stability and reliability combined with smaller size.

Our plastic molded or encapsulated units are designed to meet Specification MIL-T-27A. Class U units can be supplied on request.

Our stock line has been modified to include transformers that fit specifications most commonly used.

Send for complete Transformer and Laboratory Test Instrument Catalogs

FREED TRANSFORMER CO., INC.

1703 Weirfield St., Brooklyn (Ridgewood) 27, New York

Converters

(Continued from page 21)

switches on the front panel control the heater circuits to the converters, so that they can all be running at the same time or selected individually. A selector switch switches the input, output and B+ circuits to the converter in use; the manual gain and a.v.e. circuits are left connected together all the time. An arrangement like this permits keeping all converters warm during a contest, or the use of one only during casual operation. It also permits the ready comparison of two converters on the same band (if some later developments show up or if you want to compare different circuits), and if the two crystals are on the same frequency no retuning of the following receiver will be required.

With the crystal frequencies shown in Table I, the 7-Mc. band tunes 3.6 to 3.9 Mc., and the other bands (except 11 meters) start at 3.5 Mc. and tune higher. The tuning will be "on the nose" if the crystal frequencies are exact. Since the nominal tolerance of the crystals is .01 per cent, you will have to be prepared for an error as large as 3 kc. at 28 Mc., just in case you thought this would end all of your frequency-measuring problems. And if you want to tune more than the first 500 kc. of 10 meters, your receiver will have to tune higher than 4.0 Mc. (5.2 Mc. to hit 29.7 Mc.)

Hints & Kinks

(Continued from page 48)

USING A TV RECEIVER TO CHECK GRID-DIP METER CALIBRATION

I RECENTLY completed a kit-type grid-dip oscillator and wanted to check oscillations at the high-frequency end. The unit was designed to oscillate up to 250 Mc.

It occurred to me that the home TV set might be used to check frequencies up to 216 Mc. (Channel 13). So I turned on the grid-dip unit and the TV set. The grid-dipper was rested on top of the TV set and Channels 2 through 13 were turned on in succession. For each channel the grid-dip frequency dial was appropriately set, using the correct plug-in inductance.

It was observed that both sound and picture were distorted when the grid-dipper was tuned through the appropriate range of frequencies for each channel. It is not necessary for a station to

(Continued on page 154)

RADIO COURSES

FCC LICENSE PREPARATION

- COMMERCIAL
- AMATEUR
- TELEVISION AND RADIO SERVICING
- CODE BRUSH-UP
- THEORY

Personal Counseling

Approved for Veterans

YMCA TRADE & TECHNICAL

SCHOOL of N. Y.

15 West 63 St., New York 23, N. Y.
EN 2-8117



If you have a beam antenna...

If you are building a beam...

If you are buying a beam...



\$2.70

you need this all-new

BEAM ANTENNA HANDBOOK

by

William I. Orr, W6SAI

At your local radio dealer now!

The first complete BEAM ANTENNA HANDBOOK, covering the construction, installation and evaluation of rotary beam arrays. Now — in one volume — never-before published information

THAT WILL MAKE YOUR ANTENNA WORK!

12 chapters, over 100 charts, drawings and photographs.

Eliminate the "guesswork" in antenna construction and tuning! Whether you buy your beam, or build it yourself, following the three rules of antenna design in the BEAM ANTENNA HANDBOOK will insure efficient operation of your beam. Antenna construction is made easy by new, simplified designs and by the use of materials obtainable at your hardware store or a large mail order house!

The BEAM ANTENNA HANDBOOK describes in non-technical terms basic beam antenna theory and design, and provides dimensional charts for beam design for the 6, 10, 11, 15, 20 and 40 meter bands!

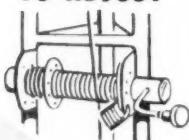
PARTIAL CONTENTS . . . true array gain figures . . . angle of radiation . . . SWR measurements . . . operating bandwidths of parasitic beams . . . matching systems . . . the new omega match . . . complete dimension charts for all bands . . . construction information and photos . . . new antenna assembly techniques . . . simple beams for the novice . . . six meter beams . . . how to evaluate your beam . . . best element spacing for maximum gain . . . sources of materials for beam antenna construction . . .

MAIL THIS COUPON TODAY FOR YOUR COPY OF THE
BEAM ANTENNA HANDBOOK

Radio Publications, Inc.	Dept. R
Danbury Road, Wilton, Conn.	
Please rush _____ copies of BEAM ANTENNA HANDBOOK at \$2.70	
per copy to:	
Name _____	Call _____
Street _____	
City _____	State _____
Enclosed find: <input type="checkbox"/> check <input type="checkbox"/> cash <input type="checkbox"/> money order	

featuring
the new omega match
the new matchmaker

TELESCOPES CRANK DOWN TO ADJUST



The answer to your prayer — crank it up or down. Used by hundreds of hams — testimonials available. Stop it at any height 20 to 40 ft. Lower it for storms. Hinged bottom. Install it yourself. SPRING LOADED RACHET WINCH can be padlocked. Good looking, husky, yet light. 3/4 in. aircraft steel. Hoist cable tested for 920 lbs. **\$58.50** FOB St. Petersburg

Packed in strong shipping carton.

Tele-Vue **TOWERS INC.**

701-707 49th ST. SO. ST. PETERSBURG, FLORIDA



WANTED! ARC-1, ART-13, ARN-7, APR-4, ARC-3, BC-610, BC-614, BC-919, TDO, BC-221, BC-342, BC-312, BC-348, 32V, 75A, TS-173, Test Eqpt, Teletype, Tech Manuals, Boehme, All types transmitters, receivers, Cash or trade for NEW National NC-300, Hallicrafters SX-100, Hammarlund HQ-140, Pro-310, BSW-5100B, Johnson Viking, Ranger, Gonset, Elmac, Morrow, Telrex, Kuehne, Fisher Hi-Fi, Penatron, Etc.

Stores: 44 Canal St., Boston, Mass. 60 Spring St., Newport, R. I.
Write or phone: Tom, W1AFN, Richmond 2-0048, 2-0916

ALLTRONICS, BOX 19, BOSTON 1, MASS.

GET YOUR COMMERCIAL TICKET EASIER WITH...

Kaufman's
**RADIO OPERATOR'S LICENSE
Q AND A MANUAL**
The **BEST** book for
FCC License Preparation

Covers elements 1 thru 8.

The only book with complete discussion of answers to every technical question in the FCC Study Guide. Makes it very easy to answer multiple choice questions. Used by more than 60 leading schools. Only \$6.60 at jobbers, bookstores or direct from:

JOHN F. RIDER PUBLISHER, INC.
480 CANAL ST., NEW YORK, N.Y.



5th Edition
up to the minute!

be operating in order to perform a quick check on any channel. As long as any kind of raster can be seen, the disturbance caused by the grid-dip oscillator will be readily seen.

This simple test actually serves two purposes: first, it shows the presence of oscillation from about 50 to 216 Mc. Second, it indicates the accuracy of dial calibrations of the instrument tested.

This same method can be used to check other types of oscillators operating in the 50- to 216-Mc. range.

— Paul Goldman, K2GKU

[EDITOR'S NOTE: Frequencies of oscillation below 50 Mc. can probably be checked quite accurately by the above method as long as the oscillator output contains harmonics falling in the TV range. The BCI and TV chapter of *The Radio Amateur's Handbook* lists the frequencies of TV Channels 2 through 13 and explains how the frequencies of the picture and the sound carriers may be determined.]

SPECIAL INK FOR SMOOTH-SURFACED QSL CARDS

ANYONE who has tried writing on the slick side of smooth-surfaced QSL cards with an ordinary fountain pen or ball-point pen has probably experienced considerable annoyance getting the ink to *take* to the surface properly. I have found that Carter's Cloth Marker (a ball-point pen with a heavy jet black ink) is the ideal solution to this problem. This inexpensive pen writes with a slightly heavier line than the ordinary pen and the ink is really indelible.

— Sam Goldish, W5TVG

WEIGHTED KEY BASE

BY USING a clean 3 X 4-inch sardine can as a mold, lead can be formed into a neat easily worked key base. Lead may be obtained from a local tire station that does wheel balancing, from fish-line sinkers, or it may be purchased in bar form.

An ordinary kitchen range will provide heat for melting the lead. Use enough material to fill the can to a depth of $\frac{3}{4}$ inch (after it has become molten). After the lead has melted, push the topside film to one side and remove with pliers. Then remove the mold from the range, allow a brief period for the lead to set, and then speed the cooling process with the aid of cold water.

Countersink the holes for the flat-head bolts used to hold base and key together. A strip of felt glued to the bottom of the base will prevent scratching of the operating table.

— John C. Hemby, W5WQQ

PLYTUBULAR BEAMS

**THE GREATEST ADVANCE
IN ROTARY BEAM DESIGN
OF THE PAST 20 YEARS.**

See your distributor or write

TENNALAB - QUINCY, ILLINOIS

FOR FULL DETAILS
SEE PAGE 171
DEC. 1955 QST

There's more than Financial Reward

offered at

univac



Yes, at

Remington Rand Univac

Money talks—and it is certainly an important consideration to all of us. Other things count too—such as the challenge and the future of a job. Univac® offers permanent, secure, and rewarding positions to

FIELD LOCATION ENGINEERS with a college degree in a scientific or engineering field and experience in electronics. Extensive electronic background may substitute for some college. Many opportunities for rapid advancement.

FIELD LOCATION TECHNICIANS Technical school background and preferably some experience in electronics. These positions can lead to full engineering responsibility.

These are assignments with Univac installations—
Univac I, Univac Scientific and File Computer.

Send complete resume to

Remington Rand Univac

DIVISION OF SPERRY RAND CORPORATION
1902 WEST MINNEHAHA AVENUE, SAINT PAUL W4, MINNESOTA

MR. D. A. BOWDOIN
Dept. F-6
2300 W. Allegheny Ave.
Philadelphia, Pa.

MR. JAMES WOODBURY
Dept. F-6
1902 W. Minnehaha Ave.
St. Paul W4, Minn.

MR. FRANK KING
Dept. F-6
Wilson Avenue
South Norwalk, Conn.



•
These are permanent non-travel positions.

•
Full salary while you receive excellent training on complex computer circuits.

•
Excellent hospitalization and insurance plans paid by company.

•
Regular merit reviews guarantee recognition for outstanding performance.



How BIG must the show be?

MARCH
19 - 22

When a facetious critic asked, "How long should a man's legs be?" Abraham Lincoln replied, "Long enough to reach the ground!"

The 1956 Radio Engineering Show is big only because it must be big to be truly representative of a gigantic industry. 704 exhibitors, 1 out of every 5 firms manufacturing for the industry, will be present.

But these 704 firms represent over 80% of the industry's production. A smaller Show would give only an inadequate picture of the year's progress and new developments.

Being BIG pays off! This truly great event brings out the best...in people, effort and products!

Registration—IRE Members \$1.00
Non-members \$3.00

What you get out of it!

- You see what is new in radio-electronic products and engineering!
- You meet the men who make these products!
- You save time...seeing in days a whole year's productive effort!
- You hear the best technical papers in subjects of your own specialty!
- You meet old friends and make new ones, enjoy association and social events!

The IRE National Convention
Waldorf Astoria Hotel, New York City
and RADIO ENGINEERING SHOW
Kingsbridge Armory & Palace, New York City



NEW! at C and G



RME-ELECTRO-VOICE
MODEL 4300 COMMUNICATIONS RECEIVER
NO FINER CHOICE THAN

Electro-Voice

- MICROPHONES
- HI-FI TUNERS, AMPLIFIERS
- P.A. PROJECTORS
- PHONO-CARTRIDGES



2502 Jefferson
Tacoma 2, Wash.

Phone
BR 3781

ALSO IN BREMERTON • OLYMPIA • ABERDEEN

80 WATTS \$69.95



The HART-75 transmits a powerful, fine quality signal—one that you can be proud of. Input: Up to 80 w. CW, SSB, w. phone. Band-switching 600 thru 10,000 cycles. External controlled oscillator. Provision for external VFO. Effective key click filter. Fused power supply. Dual 807 pi-net final. New and tuner required. SAFFER. Only 6 volts required. 90" terminals. Complete CW kit including tubes, cabinet, detailed wiring instructions, \$69.95. Plug-in modulator kit, \$19.95 extra.

Write for FREE spec sheets

HART INDUSTRIES, 467 Park Ave., Birmingham, Mich.

LEARN CODE!

SPEED UP Your
RECEIVING
with G-C

Automatic Sender

Type S
\$28.00 Postpaid in
U. S. A.



Housed in Aluminum Case Black Instrument Finished. Small—Compact—Quiet Induction type motor. 110 Volts—60 Cycle A.C.

Adjustable speed control, maintains constant speed at any setting. Complete with ten rolls of double perforated tape. A wide variety of other practice tapes available at 50¢ per roll.

GARDINER & COMPANY
STRATFORD • NEW JERSEY

YL News

(Continued from page 59)

Kazuko Hiraki, JA6KH, is the fifth licensed YL in Japan (see Feb. '55 column). Using mainly homebuilt gear, Kazuko is on 40 and 80 phone from her Fukuoka QTH.



OM K6DV who sent the photo points to the oriental flower arrangement and delicate figurine, and bids for more such femininity in YL shacks.

W1VBT, Cecile Malo, has worked forty meters during the past four years as often as caring for her four jr. ops has permitted. A member of RACES, Cecile is active in Leominster, Mass. C-D with her OM W1VBT.



Keeping Up With The Girls

W6PCA, Opal, custodian of the WAC-YL award, announces that certificate No. 4 has been issued to OM CE5AW. . . . In November seven Rhode Island YLs met and organized the Rhode Island YL Club. Charter members were W1s CEW, HUH, VXC, WED, WPX, WN1s CFT and GSD. Officers are W1VXC, Pres. and Secy., and W1CEW, V.P. and Treas. All R. I. YLs are invited to join. The club will issue a certificate to any station submitting confirmation of QSOs with ten YLs from the state. A net is conducted on 145.3 Mc. at 8:00 P.M. each Thursday with W1WPX, Evelyn, as NCS. . . . The Milwaukee Radio Amateurs' Club Auxiliary has 18 XYL members. Evelyn Dawson, the wife of W9CUW, is President. . . . W3s AKB, CDQ, and YTM were heard working in the SS contest. . . . W9OTM, Edith, reports her daughter June (ex-W9OTM) is now K6MXC in Los Angeles. . . . W3UKJ is on 14.235 kc. nightly looking especially for South American DX. Mena converses ably in Espanol. . . . On November 19th, thirteen members of the Texas YL Round-up Net celebrated the net's first anniversary with a luncheon in Dallas. Present were K5BNQ, W5s BDB, EGD, ILO IOZ, LGY, PFW, RYX, SYL, WXY, YKE, YRT, ZPD.

AN/APR-4 COMPONENTS WANTED

In any condition. NEW HIGH PRICES. Also top prices for: ARC-1, ARC-3, APR-1, APR-5A, etc.; TS-34 and other "TS—" and standard Lab Test equipment, especially for the MICROWAVE REGION; ART-13, BC-348, BC-221, LAE, LAF, LAG, and other quality Surplus equipment; also quantity Spares, tubes, plugs and cable.

ENGINEERING ASSOCIATES

434 Patterson Road

Dayton 9, Ohio

WANTED!

BY THE FIELD ENGINEERING FORCE
OF THE

Western Electric Company

•
**SINGLE SIDE BAND
Communications Engineers
and Technicians**
•

**CONTACT THESE REPRESENTATIVES
IMMEDIATELY**

W 2 C K N

Frank C. Dean
Pitney Road
Brookside, N. J.
Tel.: MEndham 3-0109

W 4 U K A

George T. Sperry
108 Oak Hill Ave.
Portsmouth, Va.
Tel.: EXport 7-4007

Bob L. Muhs
175 Thacker

Des Plaines, Ill.
Tel.: VAnderbilt 4-1084

W 6 P E Q

Tom T. Bohnsack
9952 Santa Monica Blvd.
Beverly Hills, Calif.
Tel.: BRadshaw 2-0775

OR CALL

WESTERN ELECTRIC F. E. F. HEADQUARTERS

DEPT. 623, WINSTON-SALEM, N. C.

TELEPHONE: 5-7211 EXTENSION 412

SAVE HOURS OF WORK



quickly make round, square, key and "D" openings with Greenlee Radio Chassis Punches

In 1½ minutes or less you can make a smooth, accurate hole in metal, bakelite or hard rubber with a GREENLEE Punch. Easy to operate... simply turn with an ordinary wrench. Wide range of sizes. Write for details. Greenlee Tool Co., 1862 Columbia Ave., Rockford, Ill.



FREE 164 PAGE 1956 B-A CATALOG

Complete guide to Everything in Radio, TV and Electronics for Dealers, Servicemen, Schools, Amateurs, Broadcasters, Public Utilities, Engineers, Exporters, Factories and Laboratories.

BURSTEIN-APPLEBEE CO., 1012 McGEE ST., KANSAS CITY, MO.

RADIO and TELEVISION

Over 30 years N.E. Radio Training Center. Train for all types FCC operators' licenses. Also Radio and Television servicing. FM-AM broadcasting transmitters at school. Send for Catalog Q.

MASS. RADIO SCHOOL
271 Huntington Avenue Boston 15, Massachusetts
Lic. by Comm. Mass. Dept. Educ.

COMMUNICATIONS ENGINEERS and TECHNICIANS

- Must be willing to travel when required.
- Graduate Radio Engineers or equivalent and Electronic Technicians with extensive experience in Communications systems transmitters, receivers, terminal equipment, antennas, or a combination of these.
- For assignments on design and installation of communications facilities in U.S.A. and overseas.

Excellent salaries and fringe benefits

PAGE COMMUNICATIONS ENGINEERS, INCORPORATED

710 Fourteenth Street, N.W.

Washington 5, D.C.

A.R.R.L. QSL BUREAU

The function of the ARRL QSL Bureau system is to facilitate delivery to amateurs in the United States, its possessions, and Canada of those QSL cards which arrive from amateur stations in other parts of the world. Its operation is made possible by volunteer managers in each W, K and VE call area. All you have to do is send your QSL manager (see list below) a stamped-self-addressed envelope about 4 1/4 by 9 1/2 inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

W1, K1 — D. W. Waterman, W1HPQ, 99 Flat Rock Rd., Easton, Conn.

W2, K2 — E. F. Huberman, W2JIL, P. O. Box 62, Station P, Brooklyn 12, New York.

W3, K3 — Jesse Bieberman, W3KT, P.O. Box 400, Bala-Cynwyd, Penna.

W4, K4 — Thomas M. Moss, W4HYW, Box 644, Municipal Airport Branch, Atlanta, Ga.

W5, K5 — Robert M. Roden, W5UXY, 5929 Bertha Lane, Ft. Worth, 11, Texas.

W6, K6 — Horace R. Greer, W6TI, 414 Fairmount St., Oakland, Calif.

W7, K7 — Mary Ann Tatro, W7FWR, 513 N. Central, Olympia, Wash.

W8, K8 — Walter E. Musgrave, W8NGW, 1294 E. 188th St., Cleveland 10, Ohio.

W9, K9 — John F. Schneider, W9CFT, 311 W. Ross Ave., Wausau, Wisc.

W0, K0 — Alva A. Smith, W0DMA, 238 East Main St., Caledonia, Minn.

VE1 — L. J. Fader, VE1FQ, 125 Henry St., Halifax, N. S.

VE2 — Harry J. Mabson, VE2APH, 122 Regent Ave., Beaconsfield West, Que.

VE3 — Leslie A. Whetham, VE3QE, 32 Sylvia Crescent, Hamilton, Ont.

VE4 — Len Cuff, VE4LC, 286 Rutland St., St. James, Man.

VE5 — Fred Ward, VE5OP, 809 Connaught Ave., Moose Jaw, Sask.

VE6 — W. R. Savage, VE6EO, 329 15th St., North Lethbridge, Alta.

VE7 — H. R. Hough, VE7IIR, 2316 Trent St., Victoria, B.C.

VE8 — W. L. Geary, VE8AW, Box 534, Whitehorse, Y. T.

VO — Ernest Ash, VO1A, P. O. Box 8, St. John's, Newfoundland.

KP4 — E. W. Mayer, KP4KD, Box 1061, San Juan, P. R.

KH6 — Andy H. Fuchikami, KH6BA, 2543 Namaau Dr., Honolulu, T. H.

KL7 — Box 73, Douglas, Alaska.

KZ5 — Gilbert C. Foster, KZ5GF, Box 407, Balboa, C. Z.





14th EDITION

RADIO Handbook

The very latest publication of the world famous Radio Handbook with . . . ALL NEW EQUIPMENT SHOWN!

768 pages.

A-C & D-C CIRCUITS

SEMI-CONDUCTORS

V.T. PRINCIPLES

V.T. AMPLIFIERS

OSCILLOSCOPES

R-F V.T. AMPLIFIERS

SPECIAL V.T. CIRCUITS

RECEIVER FUNDAMENTALS

R-F ENERGY GENERATION

AMPLITUDE MODULATION

FM TRANSMISSION

S.S.B. TRANSMISSION

TRANSMITTER DESIGN

TV & BC INTERFERENCE

TRANSMITTER KEYING

WORKSHOP PRACTICES

ANTENNAS, H-F, V-H-F, U-H-F & BEAMS

RADIATION, PROPAGATION

& TRANSMISSION LINES

MOBILE EQUIP. & INSTALLATION

1-Tube Mobile Converter for 75 Meters

Mobile Transmitters

12-Watt All-Band Mobile Transmitter

Universal Modulator and Power Unit

832-A Transmitter for 144 Mc.

12-Watt Fixed/Mobile X-mitter for 225 Mc.

1-Kilowatt SSB Mobile Transmitter

Antennas for Mobile Work

Constr. & Installation of Mobile Equip.

Vehicular Noise Suppression

RECEIVING EQUIPMENT

"Super-Gainer" Receiver

Universal Q-5'er

Simple Preselector for 15 and 10 Meters

All-Triode Converter for 144 Mc.

De Luxe 2-Meter Superheterodyne

C-W Man's Superheterodyne

EXCITERS & LOW POWER TRANSMITTERS

40-Watt All-Band Transmitter

High Stability VFO Unit

220-Mc. Transceiver

20-Watt 2-Meter Transmitter

75-Watt 2-Meter Transmitter

120-Watt 2-Meter Exciter for Use with

the Collins & Viking Transmitters

Versatile VFO-Exciter Unit

SPEECH & A.M. EQUIPMENT

Design of Speech Amplifiers & Modulators

120-Watt Modulator with Triode 807's

General Purpose Class B Modulator

Outboard Clipper-Filter

10-Watt Amplifier-Driver

De Luxe 15-Watt Amplifier-Driver

200-Watt 811-A Modulator

500-Watt 810 Modulator

500-Watt 304TL Modulator

HIGH FREQUENCY POWER AMPLIFIERS

Power Amplifier Design—Choice of Tubes

Push-Pull Triode Amplifiers

Push-Pull 811-A Triode Amplifier

Push-Pull Kilowatt Triode Amplifier

Push-Pull 250-TH Amplifier

Push-Pull 144 Mc. 4X-150A Amplifier

Push-Pull 813 Amplifier

Push-Pull 4-250A Kilowatt Amplifier

Pi-Network Amplifier Using a 4-125A

Kilowatt Pi-Network Amplifier

4-1000A Pi-Network Amplifier

1-Kilowatt Triode Pi-Network Amplifier

TRANSMITTER CONSTRUCTION

350-Watt P.A. for Ranger Transmitter

The Ranger as Driver for Tetrode Amplifier

Viking II as Exciter for 1-Kw. Transmitter

300-Watt Phone/C. W. Transmitter

Other Transmitter Assemblies

POWER SUPPLIES

Power Supply Design

Rectification Circuits

Standard Power Supply Circuits

Simple Transformer-type Power Supplies

Power Supply Components

Transformer Design

Special Power Supplies

TEST EQUIPMENT

Voltage, Current and Power

Measurement of Circuit Constants

Capacitance-Inductance Meter

Measurements with a Bridge

Frequency Measurements

The Grid-Dip Meter

1-Tube Sine-Wave Audio Oscillator

Antenna & Transmission Line

Measurements

Constr. of a Coaxial S-WOR Indicator

Silicon Crystal Noise Generator

\$7.50 in U.S.A. (plus sales tax)



BUY FROM YOUR FAVORITE DISTRIBUTOR

at above price or add 10% on direct mail orders to:

EDITORS and ENGINEERS, Ltd.

SUMMERTIME 9 CALIFORNIA

Bookstores: Order from Baker & Taylor Co., Hillside, N.J.

QST BINDERS



Price **\$3.00** postpaid

Available only in the United States and Possessions

Are your 1955 QSTs scattered around your shack? If so, get a QST Binder and file them away neatly for future reference. While you're at it, start the New Year right by obtaining another Binder in which to preserve those interesting 1956 issues to come.

- Holds 12 issues of QST
- Opens to any page and lies flat
- Protects and preserves your copies
- QSTs always available for reference

The AMERICAN RADIO RELAY LEAGUE, Inc. WEST HARTFORD 7, CONN.



Gives 400 watts instantaneous peak with more stability, better linearity. Needs only 20 watts drive. Free from parasitics and harmonic radiation permitting operation in fringe TV areas. Compactness ideal for portable use. Especially effective for SSSC; also delivers high quality signal on AM, FM and CW. Designed around four Modified 1625 Tetrodes. Low impedance, untuned input circuit simplifies multiband operation on 75, 40 and 20 meters. Fully described in article in June, 1955, QST.

SATISFACTION
GUARANTEED

PRICE \$169.95
(\$19.95 down, \$14.50 per month)
ALSO AVAILABLE
Modified 1625 Tetrodes \$3.75 each

P & H ELECTRONICS
424 Columbia

Lafayette, Indiana

BUY DIRECT  **SAVE MIDDLEMAN PROFITS**

MASTER MECHANIC PORTABLE LIGHT PLANTS, PUSH BUTTON START
Item 24

AC Plant 600-700 Watts — 115 v. 60 cyc. Powered by a rugged 2 hp. easy starting Briggs gas engine. No wiring necessary; just plug in and operate. Plenty of current for receivers, transmitters, antenna motors, emergency lights, etc. which require up to 700 Watts. Ideal for radio amateurs, Civil Defense, trailers and camps. Complete with Voltmeter and built-in winding to charge 6 v. auto batteries.
Item 24, Wt. 75 lbs. Be prepared if war or storm knock out power lines. \$143.50

700-800 Watt Plant (Item 44) same as above but with larger engine and greater capacity. \$169.95

1000-1200 Watt Plant (Item 45) same as Item 24 but with larger generator and engine — 50% greater output \$199.50

We make all sizes up to 25,000 Watts. Write for information.

Send for our Catalog. Free gain order.

Prices f.o.b. factory. Money back guarantee. Send check or M.O.

Master Mechanic Mfg. Co., Dept. 4-M, Burlington, Wis.

What Is This Thing Called the "Hump" in CODE?

THE hump (around 8 words) is the thing that tells you you have wasted your time in learning dotdash. Thirty years ago when we started teaching Code our students too ran head-on into the hump. We went to work to find out why. TWO-PHASE, STEP BY STEP instruction is the perfect answer. In this method dotdash is not A. The SOUND resulting from dotdash is A. There is also the important fact that correct timing. If the signals are not timed correctly the resulting sound will not be correct. There are many, many things connected with proper Code instruction, many of them so small they seem inconsequential. Others are so technical that many so-called experts fail to understand them. It's a long story but I have it all written up and will be glad to send it to you. A postcard will bring you the full story.



TELEPLEX CO. 415 G. St., MODESTO, CALIFORNIA



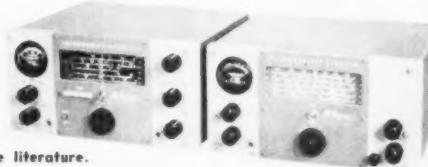
"YOU CAN HAVE
YOUR HIGH POWER - I'LL
TAKE MY BANDMASTERS
AND DO AS WELL OR BETTER"



T-90 Transmitter
with R-9 Receiver

Send for complete descriptive literature.

So says Tony, W1TVX, Edison Award Hurricane Citation Winner, who regularly works DX on 10, 20, and 75 using simple antenna systems. Tony's QTH is at Bass River on Cape Cod from where he reports into the Minuteman Net every morning. He has been an avid Bandmaster fan since he's had his ticket — uses a TBS-50 in the shack and a T-90 mobile — gets reports from his mobile better than most fixed stations get. Tony's report is not unusual. From all parts of the country the story is the same — "Harvey-Wells Bandmasters are terrific"



Harvey-Wells ELECTRONICS, INC., SOUTHBRIDGE, MASS.

TREMENDOUS CRYSTAL CLEARANCE SALE!

**Save Money—Order in
Package Quantities!**

Shipment made same day order received.
All crystals tested and guaranteed to
oscillate. Please include 20¢ postage for
every 10 crystals or less. Minimum order
\$2.50. No. C.O.D.'s.

PACKAGE DEAL No. 1

25 Assorted FT-243 45 Assorted FT-241A
15 Assorted FT-171B 15 Assorted CR-1A

100 Crystals \$8.95

Assorted Regular value \$6.00

PACKAGE DEAL No. 2

FT-241A Crystals for Single Sideband
370 KC-538 KC

35 Crystals \$3.49

Assorted Regular Value \$1.40

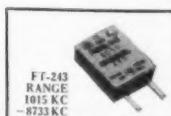
PACKAGE DEAL No. 3

HAM BAND CRYSTALS — FT-243

For operating on 80, 40, 20, 15, 10, 6 and
2 meters — on either fundamentals or
harmonics.

25 Crystals \$6.95

Assorted Regular Value \$20.00



INDIVIDUAL CRYSTALS • Indicate 2nd choice — Substitution May Be Necessary
Low Frequency — FT-241A for SSB, Lattice
Filter etc., .093" Pins, .486" wide, marked in
Channel Nos. 0 to 79, 12th Harmonic and
27 to 389, 12th Harmonic. Listed below by
Fundamental Frequencies, fractions omitted.

49¢ each — 10 for \$4.00 79¢ each — 10 for \$6.50

370 393 415 484 507 530 409 462
372 394 416 485 508 531 446 463
374 396 418 487 510 533 441 464
375 396 419 488 511 534 442 465
376 397 420 489 512 536 444 466
377 398 422 491 513 537 445 469
379 401 423 492 514 538 446 470
380 402 424 493 515 539 447 472
381 403 425 494 516 540 448 473
383 404 426 495 518 541 449 474
384 405 427 496 519 542 451 475
385 406 431 497 520 543 452 476
386 407 432 498 522 544 453 477
387 408 435 501 523 545 454 478
388 409 436 503 525 546 455 479
390 411 438 505 526 548 457 480
391 412 481 504 527 549 459 481
392 414 483 506 529 461

79¢ each — 10 for only \$6.50

CR-1A SCR 522-1/2
Pin, 1/2" SP FT-171B — BC-810
SCR 522-1/2
Pin, 1/2" SP Banana Plugs,
1/4" SPC

5910 7350 2830 2230 2360 3282 3945
6370 7380 2845 2250 2390 3215 3955
6450 7390 2865 2260 2415 3237 3995
6470 7480 2882 2280 2435 3250
6497 7580 2165 2280 2442 3322
6510 7680 2185 2300 2460 3341
6547 7830 2145 2305 2545 3528
6610 7930 2155 2320 2557 3559

FT-243 — .093" Dia. — .486" wide

49¢ each — 10 for \$4.00

4035 5397 5973 6775 7641 2940
4880 5437 6296 6860 7650 7950
4165 5485 6225 6825 7668 7975
4286 5660 6250 6875 7673 8250
4348 5677 6275 6925 7706 8290
4397 5700 6300 6950 7710 8300
4445 5700 6306 6975 7725 8306
4450 5740 6325 7450 7740 8310
4490 5750 6340 7473 7750 8316
4535 5770 6360 7500 7770 8320
4735 5780 6375 7506 7775 8630
4810 5800 6400 7520 7800 8683
4852 5840 6496 7525 7806 8690
4930 5850 6425 7540 7825
5010 5870 6450 7560 7840 8690
5030 5875 6475 7573 7841
5265 5880 6700 7575 7850
5295 5892 6706 7583 7723
5305 5906 6725 7600 7875
5327 5925 6740 7606 7900
5346 5940 6760 7625 7900
5385 5955 6773 7640 7925

79¢ each — 10 for \$5.50

1015 6140 6575 7306 8225 8575
3655 6150 6600 7325 8275 8583
3735 6173 6696 7340 8280 8640
3750 6180 6715 7350 8295 8675
3890 6185 6640 7375 8375 8650
6000 6280 6656 7425 8380 8680
6006 6440 7000 7440 8383 8700
6025 6450 7025 8000 8400 8733
6040 6460 7050 8025 8425
6140 6470 7075 8050 8450
6650 6500 7100 8100 8475
6673 6506 7125 8125 8500
6075 6525 7140 8150 8525
6100 6540 7150 8173 8550
6106 6550 7250 8175 8558
6125 6573 7300 8200 8566

sun
PARTS DISTRIBUTORS, LTD.

514 TENTH ST.
N.W., Wash., D.C. Dept. Q.

ACTIVE AMATEURS NEED these . . .



Record keeping can often be tedious. But not with the *ARRL Log Book*. Fully ruled with legible headings it helps make compliance with FCC rules a pleasure. Per book . . .

50¢

Mobile and portable operational needs are met by the pocket-size log book, the *Minilog*. Designed for utmost convenience and ease . . .

30¢

First impressions are important. Whether you handle ten or a hundred messages you want to present the addressee with a neat looking radiogram . . . and you can do this by using the *official radiogram form*. 70 blanks per pad . . .

35¢

If you like to correspond with fellow hams you will find the *ARRL membership stationery* ideal. Adds that final touch to your letter. Per 100 sheets . . .

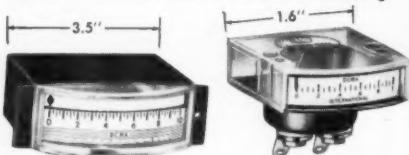
\$1.00

and they are available
postpaid from . . .

The American Radio Relay League
WEST HARTFORD, CONNECTICUT

side indicators

for MAXIMUM ACCURACY and READABILITY with SMALLER PANEL SPACE, LIGHTER WEIGHT horizontal or vertical mounting



MODEL 1145

(Showing single horizontal mounting) Scale Length: 2.7". Weight: 9.8 ounces. Plastic case. Front external zero adjuster.

MODEL 1120

(Showing single horizontal mounting) Scale Length: 1.3". Weight: 1.75 ounces. Anodized aluminum case with plastic cover.

write

FOR ENGINEERING DATA SHEETS ON:
1 1/2" Ruggedized Meters; 1" and 1 1/2" Panel
Meters, VU, DB and Illuminated Meters;
Miniature Multitesters and Side Indicators.



**international
instruments, inc.**
P.O. BOX 2954, NEW HAVEN 15, CONN.

Cable "INTERINST"



RCA INSTITUTES, INC.

A Service of Radio Corporation of America
350 West 4th St., New York 14, N. Y.

OFFERS COURSES
IN ALL TECHNICAL PHASES OF
RADIO, TELEVISION, ELECTRONICS

Approved for Veterans
Write Dept. ST for Catalog

CANADIANS! We have large stocks of nationally advertised Ham parts. Write for Free catalog.

THE CRAWFORD RADIO

VE3YR 119-121 JOHN ST., N. VE3JU
"Geo" HAMILTON, ONT. "Bill"



W2RID reports . . .

SUCCESSFUL use of ham station equipment depends on knowledge. Here are books which will make you a more successful ham station operator

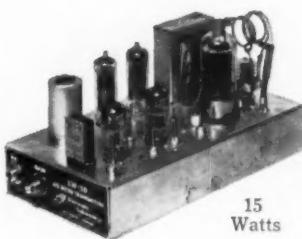
Crystal Oscillators.....	only \$1.25
A-M Detectors.....	only \$1.25
Frequency Modulation.....	only 90¢
FM Limiters & Detectors.....	only 90¢
Limiters and Clippers.....	only \$1.25
R-C & R-L Time Constant.....	only 90¢

In Canada, all prices 5% higher.

JOHN F. RIDER PUBLISHER, 480 Canal Street, New York 13, N. Y.

TWO METER or SIX METER

LW-50
TRANSMITTER



15
Watts

Pre-assembled Kits

LW-50K \$34.50

Tubes...\$10.50 Crystals...\$ 2.00

Custom Wiring\$20.00

LW-80
PRE-AMP



LW-61
CONVERTER

Gnd Grid RF
Crystal controlled
Choice of IF

\$18.50

COMPLETE—WIRED—TESTED—POSTPAID



ELECTRONIC LABORATORY
ROUTE 2,
JACKSON, MICHIGAN



Now available in KIT FORM: WIENS CONELRAD ALARM

THIS UNIT gives VISUAL ALL-CLEAR indication and a simultaneous VISUAL and AUDIO CONELRAD ALARM signal and is fail-safe. Attaches to any b.c. receiver and employs a unique audio muting system to eliminate unwanted radio audio-signals on All-Clear conditions.

Power Requirements: 6.3 vac, 1a; 250 vdc, 15 ma; 2 volts AVC

Easy to follow construction data

\$29.50 in Kit Form Postpaid

\$39.50 Completely wired and tested

WIENS ELECTRONICS LABORATORIES
DEPT. 12B

130 Crest Road, Redwood City, Calif.

EASY TO LEARN CODE

It is easy and pleasant to learn or increase speed the modern way — with an **Instructograph Code Teacher**. Excellent for the beginner or advanced student. A quick, practical and dependable method. Available tapes from beginner's alphabet to 40 WPM. Speed range to 40 WPM. Always ready; no QRM, beats having someone send to you.

ENDORSED BY THOUSANDS!

The **Instructograph Code Teacher** literally takes the place of an operator-instructor and enables anyone to learn and master code without further assistance. Innumerable successful operators have "taught the code" with the **Instructograph System**. Write today for full particulars and convenient rental plans.

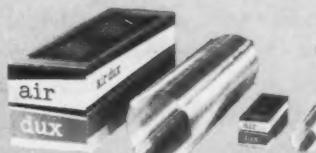


INSTRUCTOGRAPH COMPANY

4709 SHERIDAN ROAD, CHICAGO 49, ILLINOIS

air dux

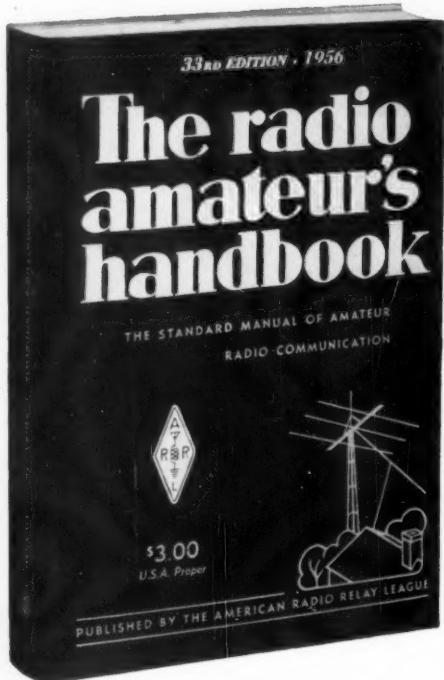
air wound coils are packaged
in 162 different sizes
to suit almost every need
of the amateur.



Look for the bright blue and
black carton at your jobber.

illuminitronic  engineering
sunnyvale

california



1956 EDITION

NOW
AVAILABLE
!

RECOGNIZED as one of the most valuable and widely used books in electronics, the Handbook is universally consulted by both amateur and professional alike. The more than 700 pages in this new edition have been revised and modified in the light of current application and technique. The Handbook is found on the desks of executives, engineers, technicians and purchasing agents of the radio industry as often as in the shacks of radio amateurs throughout the world. As a text alone it is widely used in radio schools, colleges and the Armed Forces. Twenty-six chapters plus a catalog section featuring electronic components and equipment of leading manufacturers and suppliers. Contains one of the most complete listings of vacuum tube and semiconductor data in existence.

\$3 USA proper

\$3.50 US Possessions and Canada
Buckram Bound Edition \$5 Everywhere

\$4 Elsewhere

The AMERICAN RADIO RELAY LEAGUE, Inc.
WEST HARTFORD 7, CONN.

HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.

(2) No direct and character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters.

(3) The Ham-Ad rate is 30¢ per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(5) Closing date for HAM-ADS is the 20th of the second month preceding publication date.

(6) A special rate of 7¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature, and is placed and signed by a member of the American Radio Relay League. Thus, if any of the following is special equipment owned and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, if by a member of the American Radio Relay League, take the 7¢ rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising by makes the 30¢ rate. Provision of paragraphs (1), (2) and (3) apply to all advertising in this column regardless of which rate may apply. To expedite handling of your copy please state whether you are a member of ARRL.

(7) Because error is more easily avoided, it is requested that signature and address be printed plainly. Typewriter copy preferred, but handwritten signature must accompany all authorized insertions.

(8) No advertiser may use more than 100 words in any one issue nor more than one ad in one issue.

Having made no investigation of the advertisers in the classified columns, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

QUARTZ — Direct importers from Brazil of best quality pure quartz suitable for making piezo-electric crystals. Diamond Drill Corp., 248 Madison Ave., New York City 16.

MOTOROLA used FM communication equipment bought and sold. WSBCO, Ralph Hicks, 204 E. Fairview, Tulsa, Okla.

WANTED: Cash or trade, fixed frequency receivers 28/42 Mc. W9YIV, Troy, Ill.

WANTED: Early wireless gear, books, magazines and catalogs (before 1922). Send description and prices. W6CH, 1010 Monte Drive, Santa Barbara, Calif.

CODE etc? Try new method. Free particulars. Donald H. Rogers, Ixleyland, Penna.

SUBSCRIPTIONS. Radio publications. Latest Call Books, \$4.00. Mrs. Earl Mead, Huntley, Montana.

MICHIGAN HAM-SI Amateur supplies, standard brands. Store hours 0800 to 1800 Monday through Saturday. Roy J. Purchase, WSRP, Purchase Radio Supply, 605 Church St., Ann Arbor, Michigan. Tel. ORNandy 8-8696. NOrmandy 8-8262.

WANTED: All types aircraft & ground transmitters, receivers, ART-13, RT18/ARCI, 5R/ARN7, BC610E, BC211 mounts and parts wanted. Fairest prices possible paid. Dames, W2KUW, 308 Hickory St., Arlington, N. J.

PANORAMIC Adapter AN/APA-10 Tech. Manuals \$2.75 postpaid in U. S. Electronicraft, 27 Milburn St., Bronxville 8, N. Y.

DX-C-GRAFPH. The DX man's guide for band conditions. Know where to work best. Foremost DXers use it. \$2.50. Request flyer. Box 4596, Winona-Salem, N. C.

RECEIVERS repaired and aligned by competent engineers, using factory standard instruments. Hallicrafters, Hammarlund, National, Collins authorized service station. Our twentieth year. Douglas Instrument Laboratory, 176 Norfolk Ave., Boston 19, Mass. NEW ICA de luxe Signatone Code Oscillator (Reg. #15.75); Special \$7.95. Key, \$1.35 extra. Surplus RG-8/U cable, 100 ft., \$5.95. 250 ft., \$13.25. 500 ft., \$25.00. Free Bargain Bulletin. Visit store for unadvertised bargains. Electronic Products, 719 Arch St., Philadelphia, Pa.

OUTSTANDING ham list received monthly. Our prices on trade-in are realistic and down to earth. We feature Johnson, National, Collins, Hallicrafters, Gonset, Elmac, Harvey-Well, Morrow, Central Electronics and all leaders. We trade easy and offer time payments tailored for you. All leading brands of equipment in stock. Write today for latest bulletin and a copy of our new catalog just released. Stan Burghardt, WB7VJ, Burghardt Radio Supply, Inc., Box 746, Waterbury, Conn.

MULTI-BAND Antenna, 80-40-20-10. \$18.95. Patented. Send stamp for information. Lattin Radio Laboratories, Owensboro, Ky. UFO Patrol data, W5CA.

ATTENTION Manufacturers! Lees-Neville 6 volt 100 amp. system alternator, regulator & rectifier, \$60.00. Also Lees-Neville 12-volt 100 amp. system, alternator, regulator & rectifier, \$85.00. Good condition. H. A. Zimmermann Jr., K2PAT, 570 Jamaica Ave., Brooklyn 8, N. Y. Ulster 2-3472.

U. S. A. DX QSL Co-op. Free information write: Bill Tagan, W6DNN, P. O. Box 5938, Kansas City 11, Mo.

WANTED: QST March and May 1916 \$25.00 each or will swap any eight 1917 or 1919 issues for each. Have 1935 to 1954 complete. Four issues or more at 25¢ each. W6BMCX, 1022 N. Rockhill Rd., Rock Hill 19, Mo.

CASH for your gear. We buy as well as sell. Write for cash offer or trade. We stock Elmer, Gonset, Hallicrafters, Hammarlund, Collins, Lees, Master, Mobile, Morris, National and other ham gear.

H & H Electronic Supply, Inc., 506 Kishwaukee St., Rockford, Ill. **HEATHKIT** and Johnson equipment wired and tested. Write Matt, 2322 So. 2nd Ave., No. Riverside, Ill.

QSL'S? SWLS? Largest variety and finest samples, 25¢ (refunded) Callbooks (latest) \$4.00. "Rus" Sakkars, W8DED, P. O. Box 218 Holland, Mich.

QSL'S-SWLS. Meade W8KX1, 1507 Central Avenue, Kansas City, Kans.

QSL'S-SWLS. 100, \$2.85 up. Samples 10¢. Griffeth, W3FSW, 1042 Pine Heights Ave., Baltimore, Md.

QSL'S. Nice designs. Samples. Beseparis, W3QCC, 207 S. Balliet St., Frankville, Pa.

QSL Specialists. Distinctive. Samples free. DRJ Studios, 1811 N. Lowell Ave., Chicago 39, Ill.

DELUXE QSL'S — Petty, W2HAZ, Box 27, Trenton, N. J. Samples 10¢.

QSL'S-SWLS. Samples free. Bartinoski, W2CVE Press, Williams town, N. J.

QSL'S of distinction! Three colors and up, 10¢ brings you samples of distinction. Uncle Fred, Box 86, Lynn, Penna.

QSL'S. Samples free. Albertson, W4HUD, Box 322, High Point, N. C. QSL'S "Brownie," W3CJ1, 3110 Lehigh, Allentown, Penna. Samples 10¢; with catalogue, 25¢.

QSL'S. Samples. Dime, refunded. Roy Gale, W1BD, Waterford, Conn. 14, Ohio.

QSL'S. Western states only. Fast delivery. Samples 10¢. Dauphin, K6JCN, Box 66009, Mar Vista 66, Calif.

WOODY'S (Formerly Rosedale Press QSL'S). Box 164, Asher Sta., Little Rock, Ark.

QSL'S. Taprit, Union, Miss.

QSL'S. Postcard brings samples. Fred Leyden, W1NZJ, 454 Proctor Ave., Revere 51, Mass.

QSL'S. SWLS. High quality. Reasonable prices. Samples. Bob Teachout, W1FSV, 204 Adams St., Rutland, Vt.

QSL'S Multicolor. all kinds, all prices. Samples dime. Fast service. DX Cards, Kulik St., Clifton, N. J.

QSL'S. Comic, rurals, Doctors!! Samples 10¢. C. Fritz, 1213 Briargate, Joliet, Ill.

QSL'S. Fluorescent, Rainbow, cartoons. All types. Samples 10¢. Catalog, 25¢. World Printing, 166 Barkley Avenue, Clifton, N. J.

QSL'S. Samples, dime. Printer, Corwith, Iowa.

QSL'S-SWLS. Samples free. Backus, 5318 Walker Ave., Richmond, Va.

QSL'S-SWLS. Samples free. W3EHA, Cy Jones, 340 The Terrace, North, Hagerstown, Md.

QSL'S-SWLS. Cartoons, colors, etc. Samples, 15¢ (refunded). Chris, W9PPA, 365 Terra Cotta, Crystal Lake, Ill.

QSL'S-SWLS. 2 colors, 125, \$2.00. Samples, 10¢. Bob Garra, Lehighton, Penna.

QSL'S. The kind you want! Samples, 10¢. Graphic Crafts, Route 12, F. Wayne, Ind.

QSL'S. Something new, different, multicolored Jumbo on glossy stock or our beautiful blue, silver and gold on standard glossy cards either 100 for \$3.85 or 200 for \$7.50. Sorry no samples but satisfaction guaranteed on every service. The Constant Press, Bladensburg, Md.

QSL'S. 3100B1 (modem) \$185; UTC Kw plate Transformer for CG-300, 4800, 10000 volt, 500 Ma. G.S. \$40.00. Thorderson choke 10 by 450 Ma, 10 Kv. insulation \$8.00. UTC S4 plate transformer 3000, 2500, 2000 volts et. 300 Ma., \$15.00 cash only. Andrew Spiro, W2SUC, 2739 Wallace Avenue, New York City, N. Y.

FOR SALE: AR-2 Heathkit; recvt and cabinet. Like new. \$25.00. William Donohue, K2LIV, 46 Ford Ave., Freehold, N. J.

FLORIDA Bound? Stop at Tamishaw Motel, Ham's Haven, North Trail, Ft. Myers, Fla. "Ed" Long, K4GEW.

CASH for BC-610E, BC-614E, BC-9.19, BC-729, BC-221, BC-312, 348, TCS, AN/GRC-9 and higher, and parts for all these. Amber Industrial Corporation, Surplus Div., 75 Varick Street, N. Y. C. 10, N. Y.

FOR SALE: SX-71; \$135; 32VT, \$325. Both are in excellent condition. C. B. Story, W7TGZ, 540 Wyoming Ave., Sheridan, Wyoming.

COLLINS KW-1 in excellent condition, \$2500. F.O.B. location. National HRC, 1000-1200, Electrosynic Devices, Inc., 642 Grant St., Pittsburgh 19, Penna.

CLEANING Shack! Have equipment for AM, SSB, Power supplies, rotator, Hi-Fi, air conditioner, books, magazines, test equipment for TV-Radio repair, few TVs and radio-phonos. Consider trades. Stamp for list. W4API, 1420 South Randolph, Arlington 4, Va.

WANTED: Viking Mobile, \$65 plus shipping. W9BQR.

KEEP your QSL's filed for quick reference in our Hammerloid Steel file, size 11" by 6 1/4" by 5" with alphabetical index. Will initial call letters if desired. State call. Send \$5.50. We pay shipping. G. Kaminski, 2814 Albion St., Toledo 6, Ohio.

FOR SALE: Never used, (3) 81s, \$5 ea; HK-54, \$2; 829B, \$5; 21s, \$2; 82s, \$2; ea; Chi, xfrm 1100vt @ 300 Ma. w/mthg chokes.

GR Eldron Gerald, W7BWH, 2323 N. 39th Pl., Phoenix, Ariz.

RUBBER Stamp: Call, name and address, \$1.00, includes inking pad. Richard's, 2029T Bradley, Chicago 18, Ill.

2-METER beams: 6 element, horizontal or vertical, all seamless aluminum. \$6.95 prepaid. Wholesale Supply Co., Lumberton, Mass.

WANTED: ARCI, ART-13 transmitter. Write to W4VHG, Box 5878, Bethesda, Md.

WANTED: ART-13, ARC-3, ARN-6, ARN-7 test sets, other military surplus. Advise price, condx. We pay freight and C.O.D. James S. Spivey, Inc., 4908 Hampden Lane, Bethesda, Md.

NATIONAL NC-57B with "S" meter accessory. In good condx: \$50. K2DIL, 1845 Greenport Rd., Far Rockaway 91, N. Y.

FOR SALE: Collins 32V-3, \$500; 75A-2 with calibrator and speaker, \$300.00, both perfect. Herb Hollister, W9DRD, 709 Baseline, Boulder, Colo.

VERTICAL antenna: 20-40-80M, \$59.50 to \$89.50. Information on request. El Cajon Electronic Engineering Enterprises, Building 4, Gillespie Field, Santee, Calif.

ENGRAVING: Call letters white on black, 2" x 8", \$1.50; Key-chains 1" x 3", \$0.60; also signs, trophies, plaques, nameplates, panels, etc. Inquiries invited. Cliff Head, W2PKH, 343 Fayette St., Bridgeton, N. J.

BARGAINS: with new guarantee: S-38D, \$39.50; S-40A or S-77, \$69.00; S-47C, \$59.00; HPS-10 power supply, \$99.00; Elyco 600, \$79.00; S-27, \$79.00; S-76, \$149.00; SX-10, \$150.00; SX-96, \$100.00; HQ-140X, \$199.00; SX-42, \$159.00; HRO-5071, \$299.00; Collins 75A3, \$375.00; Sonar VFX-680, \$29.50; Elico TR75TV, \$35.00; Heath AT-1, \$24.50; Meck T60, \$39.50; HT-17, \$29.95; EX Shifter, \$15.00; Globe Scout 40A, \$69.50; Globe Trotter, \$49.50; HT18, \$59.00; Eimac 340A, \$149.00; Eimac 541H, \$89.00; PSA 500, \$27.50; Viking I, \$159.00; Viking II, \$29.00; Elico 500, \$75.00; \$249.00; Globe King 400A, \$299.00; 32V1, \$325.00; 32V2, \$275.00; and many others. Free trial. Terms financed by Leo, W6GFQ. Write for catalog and best deals to World Radio Laboratories, 3415 West Broadway, Council Bluffs, Iowa.

TREMENDOUS bargains: New and reconditioned Collins, Hallcrafters, National, Johnson, Elmac, all others. Completely reconditioned with new guarantee: S-38, \$29.00; S-40B, \$79.00; SX-71, \$149.00; SX-62, \$159.00; SX-96, \$100.00; HQ-140X, \$199.00; National NC-125, \$129.00; NC-171, \$139.00; NC-183, \$179.00; HROSOT-1, \$229.00; NC-183D; HROSOT-1; HRO-60; Collins 75A1, \$249.00; 75A2, \$299.00; 75A3, \$399.00; 32V1, \$27.50; 32V2, \$27.50; Viking Ranger, Viking II, large stock of mobile receivers, transmitters, and many hundreds of other items. Easy terms. Shipped on trial. Write for free list. Henry Radio, Butler, Missouri.

WANT Auto keying head for perforated tape. Drive and polar relay not required. State make, model, condx, price. Nisbet, W8ZLH, Box 243, Bryan, Ohio. 43212. W3VAG, Riderwood, Maryland. Phone VA 1-1759.

WANT: ARC-1, ART-13, DV-17, CU-25, BC-610, BC-614, BC-939, BC-221, BC-312, BC-342, BC-348, TD¹, APR-4, 32V, 75A, teletype, Boehme, test equip., manuals, TCS dynamotors, amateur receivers, transmitters. Cast or trade for New National NC-300. Hallicrafters SX-10, Hammarlund HQ-140X, HQ-140, B&W 100B, Johnson Viking, Ranger, Gonsset, Elmac, Morris, Teltron, Kishinev, Fisher Hi-Fi, Pentron, etc. Stores: 44 Canal, Boston, 60 Springfield, R. I. Write: Tom, W1AFN, Alltronics, Boston 1, Mass. Phone: Richmond 2-0048, 2-0916.

SELL: 60 watt Multi-Match modulator and pwr supply, \$30.00. Scott Smithson, Colonial Beach, Va.

FOR Sale: Heathkit AT-1, VF-1, AC-1. Like new, \$55.00. B. H. Cathay, KA4LG, 265 S. Main, Davidson, N. C.

VIKING Ranger in original carton, \$195.00. Looks like new. Works perfectly. John Miller, 17 Polster Drive, Evansville, Ind.

SELLING VHF-152A, \$40; Precision E-400 FM signal generator with xtals, \$85. John Holmbeck, W9KZO, 853 Lincoln St., Burlington, Wis.

TROJAN battery charger, like new, 36-cell capacity, charges 6-12-24, etc. at the same rate. Extra power bulb, \$10. Sunbeam electric heater with blower, in grid condx, \$5.00. Includes matching type writer and case, 4 row keyboard etc. condx, \$25. A eliminate 6V gen. xtals. Send stamp for detailed list. Cash or trade? Trade new blood pressure gauge, complete with instru. book and stethoscope, 12 gauge Ithaca trap gun, L. Blum, 1587 Kent St., Columbus 5, Ohio.

SEATTLE: For sale: Viking Ranger, \$180; 75A2 w/spkr, \$300. John Leeson, W7WZK, 2846 W. 67th St., Seattle, 7, Wash.

GOING Mobile! Viking II, filter, coat relay, \$220; SX-71, matching speaker, \$15; Heathkit Q-multiplier, Bud calibrator, CDR rotator, aluminum power supply. All inquiries will be answered. F. o. b. Ft. Worth, Texas. K5ADD, Box 289, Carrollton, AFB.

NATIONAL HRO-60 with R-42 speaker, in new condx, \$400; Johnson Viking I with Viking VFO custom, \$150.00. Want to trade new 929-B, \$200. Andy Martin, W6UJ, Box 264, Carmel, Calif.

FOR Sale or trade: Crystal mike, \$5.00; desk mike stand, \$2.00; portable mill, \$10; General Electric LB-530 self-charging 3-way portable radio, \$25; all in excellent condx, prices F. o. b. V. R. Hein, 418 Gregory, Rockford, Illinois.

JOHNSON Viking Adventurer, \$44.95; VFO, \$44.95; Mobile, \$39.95; TVI led, \$249.95; II, \$265.00; mobile VFO, \$34.95; Match box, \$19.95; Eico 221, \$10.95; 401, \$9.95; 403, \$29.95; 500, \$79.95; 600, \$99.95; 600A, \$129.95; 650, \$69.95; 660, \$129.95; 660A, \$129.95; 660B, \$129.95; 660C, \$129.95; 660D, \$129.95; Harvey-Wellis APS-50, \$29.95; VFO, \$17.50; TBS-50C, \$69.95; TBS-50D, \$49.95; National HFS, \$99.95; HRO-5, \$99.95; HRO-3, \$99.95; HRO-60, \$399.95; 1-10, \$29.95; NC-57, \$69.95; NC-98, \$119.95; NC-100, \$100.00; NC-173, \$129.95; NC-183D, \$299.95; NC-183, \$299.00; 32V1, \$29.95; 32V2, \$29.95; 32V3, \$29.95; 32V4, \$29.95; 32V5, \$29.95; 32V6, \$29.95; 32V7, \$29.95; 32V8, \$29.95; 32V9, \$29.95; 32V10, \$29.95; 32V11, \$29.95; 32V12, \$29.95; 32V13, \$29.95; 32V14, \$29.95; 32V15, \$29.95; 32V16, \$29.95; 32V17, \$29.95; 32V18, \$29.95; 32V19, \$29.95; 32V20, \$29.95; 32V21, \$29.95; 32V22, \$29.95; 32V23, \$29.95; 32V24, \$29.95; 32V25, \$29.95; 32V26, \$29.95; 32V27, \$29.95; 32V28, \$29.95; 32V29, \$29.95; 32V30, \$29.95; 32V31, \$29.95; 32V32, \$29.95; 32V33, \$29.95; 32V34, \$29.95; 32V35, \$29.95; 32V36, \$29.95; 32V37, \$29.95; 32V38, \$29.95; 32V39, \$29.95; 32V40, \$29.95; 32V41, \$29.95; 32V42, \$29.95; 32V43, \$29.95; 32V44, \$29.95; 32V45, \$29.95; 32V46, \$29.95; 32V47, \$29.95; 32V48, \$29.95; 32V49, \$29.95; 32V50, \$29.95; 32V51, \$29.95; 32V52, \$29.95; 32V53, \$29.95; 32V54, \$29.95; 32V55, \$29.95; 32V56, \$29.95; 32V57, \$29.95; 32V58, \$29.95; 32V59, \$29.95; 32V60, \$29.95; 32V61, \$29.95; 32V62, \$29.95; 32V63, \$29.95; 32V64, \$29.95; 32V65, \$29.95; 32V66, \$29.95; 32V67, \$29.95; 32V68, \$29.95; 32V69, \$29.95; 32V70, \$29.95; 32V71, \$29.95; 32V72, \$29.95; 32V73, \$29.95; 32V74, \$29.95; 32V75, \$29.95; 32V76, \$29.95; 32V77, \$29.95; 32V78, \$29.95; 32V79, \$29.95; 32V80, \$29.95; 32V81, \$29.95; 32V82, \$29.95; 32V83, \$29.95; 32V84, \$29.95; 32V85, \$29.95; 32V86, \$29.95; 32V87, \$29.95; 32V88, \$29.95; 32V89, \$29.95; 32V90, \$29.95; 32V91, \$29.95; 32V92, \$29.95; 32V93, \$29.95; 32V94, \$29.95; 32V95, \$29.95; 32V96, \$29.95; 32V97, \$29.95; 32V98, \$29.95; 32V99, \$29.95; 32V100, \$29.95; 32V101, \$29.95; 32V102, \$29.95; 32V103, \$29.95; 32V104, \$29.95; 32V105, \$29.95; 32V106, \$29.95; 32V107, \$29.95; 32V108, \$29.95; 32V109, \$29.95; 32V110, \$29.95; 32V111, \$29.95; 32V112, \$29.95; 32V113, \$29.95; 32V114, \$29.95; 32V115, \$29.95; 32V116, \$29.95; 32V117, \$29.95; 32V118, \$29.95; 32V119, \$29.95; 32V120, \$29.95; 32V121, \$29.95; 32V122, \$29.95; 32V123, \$29.95; 32V124, \$29.95; 32V125, \$29.95; 32V126, \$29.95; 32V127, \$29.95; 32V128, \$29.95; 32V129, \$29.95; 32V130, \$29.95; 32V131, \$29.95; 32V132, \$29.95; 32V133, \$29.95; 32V134, \$29.95; 32V135, \$29.95; 32V136, \$29.95; 32V137, \$29.95; 32V138, \$29.95; 32V139, \$29.95; 32V140, \$29.95; 32V141, \$29.95; 32V142, \$29.95; 32V143, \$29.95; 32V144, \$29.95; 32V145, \$29.95; 32V146, \$29.95; 32V147, \$29.95; 32V148, \$29.95; 32V149, \$29.95; 32V150, \$29.95; 32V151, \$29.95; 32V152, \$29.95; 32V153, \$29.95; 32V154, \$29.95; 32V155, \$29.95; 32V156, \$29.95; 32V157, \$29.95; 32V158, \$29.95; 32V159, \$29.95; 32V160, \$29.95; 32V161, \$29.95; 32V162, \$29.95; 32V163, \$29.95; 32V164, \$29.95; 32V165, \$29.95; 32V166, \$29.95; 32V167, \$29.95; 32V168, \$29.95; 32V169, \$29.95; 32V170, \$29.95; 32V171, \$29.95; 32V172, \$29.95; 32V173, \$29.95; 32V174, \$29.95; 32V175, \$29.95; 32V176, \$29.95; 32V177, \$29.95; 32V178, \$29.95; 32V179, \$29.95; 32V180, \$29.95; 32V181, \$29.95; 32V182, \$29.95; 32V183, \$29.95; 32V184, \$29.95; 32V185, \$29.95; 32V186, \$29.95; 32V187, \$29.95; 32V188, \$29.95; 32V189, \$29.95; 32V190, \$29.95; 32V191, \$29.95; 32V192, \$29.95; 32V193, \$29.95; 32V194, \$29.95; 32V195, \$29.95; 32V196, \$29.95; 32V197, \$29.95; 32V198, \$29.95; 32V199, \$29.95; 32V200, \$29.95; 32V201, \$29.95; 32V202, \$29.95; 32V203, \$29.95; 32V204, \$29.95; 32V205, \$29.95; 32V206, \$29.95; 32V207, \$29.95; 32V208, \$29.95; 32V209, \$29.95; 32V210, \$29.95; 32V211, \$29.95; 32V212, \$29.95; 32V213, \$29.95; 32V214, \$29.95; 32V215, \$29.95; 32V216, \$29.95; 32V217, \$29.95; 32V218, \$29.95; 32V219, \$29.95; 32V220, \$29.95; 32V221, \$29.95; 32V222, \$29.95; 32V223, \$29.95; 32V224, \$29.95; 32V225, \$29.95; 32V226, \$29.95; 32V227, \$29.95; 32V228, \$29.95; 32V229, \$29.95; 32V230, \$29.95; 32V231, \$29.95; 32V232, \$29.95; 32V233, \$29.95; 32V234, \$29.95; 32V235, \$29.95; 32V236, \$29.95; 32V237, \$29.95; 32V238, \$29.95; 32V239, \$29.95; 32V240, \$29.95; 32V241, \$29.95; 32V242, \$29.95; 32V243, \$29.95; 32V244, \$29.95; 32V245, \$29.95; 32V246, \$29.95; 32V247, \$29.95; 32V248, \$29.95; 32V249, \$29.95; 32V250, \$29.95; 32V251, \$29.95; 32V252, \$29.95; 32V253, \$29.95; 32V254, \$29.95; 32V255, \$29.95; 32V256, \$29.95; 32V257, \$29.95; 32V258, \$29.95; 32V259, \$29.95; 32V260, \$29.95; 32V261, \$29.95; 32V262, \$29.95; 32V263, \$29.95; 32V264, \$29.95; 32V265, \$29.95; 32V266, \$29.95; 32V267, \$29.95; 32V268, \$29.95; 32V269, \$29.95; 32V270, \$29.95; 32V271, \$29.95; 32V272, \$29.95; 32V273, \$29.95; 32V274, \$29.95; 32V275, \$29.95; 32V276, \$29.95; 32V277, \$29.95; 32V278, \$29.95; 32V279, \$29.95; 32V280, \$29.95; 32V281, \$29.95; 32V282, \$29.95; 32V283, \$29.95; 32V284, \$29.95; 32V285, \$29.95; 32V286, \$29.95; 32V287, \$29.95; 32V288, \$29.95; 32V289, \$29.95; 32V290, \$29.95; 32V291, \$29.95; 32V292, \$29.95; 32V293, \$29.95; 32V294, \$29.95; 32V295, \$29.95; 32V296, \$29.95; 32V297, \$29.95; 32V298, \$29.95; 32V299, \$29.95; 32V300, \$29.95; 32V301, \$29.95; 32V302, \$29.95; 32V303, \$29.95; 32V304, \$29.95; 32V305, \$29.95; 32V306, \$29.95; 32V307, \$29.95; 32V308, \$29.95; 32V309, \$29.95; 32V310, \$29.95; 32V311, \$29.95; 32V312, \$29.95; 32V313, \$29.95; 32V314, \$29.95; 32V315, \$29.95; 32V316, \$29.95; 32V317, \$29.95; 32V318, \$29.95; 32V319, \$29.95; 32V320, \$29.95; 32V321, \$29.95; 32V322, \$29.95; 32V323, \$29.95; 32V324, \$29.95; 32V325, \$29.95; 32V326, \$29.95; 32V327, \$29.95; 32V328, \$29.95; 32V329, \$29.95; 32V330, \$29.95; 32V331, \$29.95; 32V332, \$29.95; 32V333, \$29.95; 32V334, \$29.95; 32V335, \$29.95; 32V336, \$29.95; 32V337, \$29.95; 32V338, \$29.95; 32V339, \$29.95; 32V340, \$29.95; 32V341, \$29.95; 32V342, \$29.95; 32V343, \$29.95; 32V344, \$29.95; 32V345, \$29.95; 32V346, \$29.95; 32V347, \$29.95; 32V348, \$29.95; 32V349, \$29.95; 32V350, \$29.95; 32V351, \$29.95; 32V352, \$29.95; 32V353, \$29.95; 32V354, \$29.95; 32V355, \$29.95; 32V356, \$29.95; 32V357, \$29.95; 32V358, \$29.95; 32V359, \$29.95; 32V360, \$29.95; 32V361, \$29.95; 32V362, \$29.95; 32V363, \$29.95; 32V364, \$29.95; 32V365, \$29.95; 32V366, \$29.95; 32V367, \$29.95; 32V368, \$29.95; 32V369, \$29.95; 32V370, \$29.95; 32V371, \$29.95; 32V372, \$29.95; 32V373, \$29.95; 32V374, \$29.95; 32V375, \$29.95; 32V376, \$29.95; 32V377, \$29.95; 32V378, \$29.95; 32V379, \$29.95; 32V380, \$29.95; 32V381, \$29.95; 32V382, \$29.95; 32V383, \$29.95; 32V384, \$29.95; 32V385, \$29.95; 32V386, \$29.95; 32V387, \$29.95; 32V388, \$29.95; 32V389, \$29.95; 32V390, \$29.95; 32V391, \$29.95; 32V392, \$29.95; 32V393, \$29.95; 32V394, \$29.95; 32V395, \$29.95; 32V396, \$29.95; 32V397, \$29.95; 32V398, \$29.95; 32V399, \$29.95; 32V400, \$29.95; 32V401, \$29.95; 32V402, \$29.95; 32V403, \$29.95; 32V404, \$29.95; 32V405, \$29.95; 32V406, \$29.95; 32V407, \$29.95; 32V408, \$29.95; 32V409, \$29.95; 32V410, \$29.95; 32V411, \$29.95; 32V412, \$29.95; 32V413, \$29.95; 32V414, \$29.95; 32V415, \$29.95; 32V416, \$29.95; 32V417, \$29.95; 32V418, \$29.95; 32V419, \$29.95; 32V420, \$29.95; 32V421, \$29.95; 32V422, \$29.95; 32V423, \$29.95; 32V424, \$29.95; 32V425, \$29.95; 32V426, \$29.95; 32V427, \$29.95; 32V428, \$29.95; 32V429, \$29.95; 32V430, \$29.95; 32V431, \$29.95; 32V432, \$29.95; 32V433, \$29.95; 32V434, \$29.95; 32V435, \$29.95; 32V436, \$29.95; 32V437, \$29.95; 32V438, \$29.95; 32V439, \$29.95; 32V440, \$29.95; 32V441, \$29.95; 32V442, \$29.95; 32V443, \$29.95; 32V444, \$29.95; 32V445, \$29.95; 32V446, \$29.95; 32V447, \$29.95; 32V448, \$29.95; 32V449, \$29.95; 32V450, \$29.95; 32V451, \$29.95; 32V452, \$29.95; 32V453, \$29.95; 32V454, \$29.95; 32V455, \$29.95; 32V456, \$29.95; 32V457, \$29.95; 32V458, \$29.95; 32V459, \$29.95; 32V460, \$29.95; 32V461, \$29.95; 32V462, \$29.95; 32V463, \$29.95; 32V464, \$29.95; 32V465, \$29.95; 32V466, \$29.95; 32V467, \$29.95; 32V468, \$29.95; 32V469, \$29.95; 32V470, \$29.95; 32V471, \$29.95; 32V472, \$29.95; 32V473, \$29.95; 32V474, \$29.95; 32V475, \$29.95; 32V476, \$29.95; 32V477, \$29.95; 32V478, \$29.95; 32V479, \$29.95; 32V480, \$29.95; 32V481, \$29.95; 32V482, \$29.95; 32V483, \$29.95; 32V484, \$29.95; 32V485, \$29.95; 32V486, \$29.95; 32V487, \$29.95; 32V488, \$29.95; 32V489, \$29.95; 32V490, \$29.95; 32V491, \$29.95; 32V492, \$29.95; 32V493, \$29.95; 32V494, \$29.95; 32V495, \$29.95; 32V496, \$29.95; 32V497, \$29.95; 32V498, \$29.95; 32V499, \$29.95; 32V500, \$29.95; 32V501, \$29.95; 32V502, \$29.95; 32V503, \$29.95; 32V504, \$29.95; 32V505, \$29.95; 32V506, \$29.95; 32V507, \$29.95; 32V508, \$29.95; 32V509, \$29.95; 32V510, \$29.95; 32V511, \$29.95; 32V512, \$29.95; 32V513, \$29.95; 32V514, \$29.95; 32V515, \$29.95; 32V516, \$29.95; 32V517, \$29.95; 32V518, \$29.95; 32V519, \$29.95; 32V520, \$29.95; 32V521, \$29.95; 32V522, \$29.95; 32V523, \$29.95; 32V524, \$29.95; 32V525, \$29.95; 32V526, \$29.95; 32V527, \$29.95; 32V528, \$29.95; 32V529, \$29.95; 32V530, \$29.95; 32V531, \$29.95; 32V532, \$29.95; 32V533, \$29.95; 32V534, \$29.95; 32V535, \$29.95; 32V536, \$29.95; 32V537, \$29.95; 32V538, \$29.95; 32V539, \$29.95; 32V540, \$29.95; 32V541, \$29.95; 32V542, \$29.95; 32V543, \$29.95; 32V544, \$29.95; 32V545, \$29.95; 32V546, \$29.95; 32V547, \$29.95; 32V548, \$29.95; 32V549, \$29.95; 32V550, \$29.95; 32V551, \$29.95; 32V552, \$29.95; 32V553, \$29.95; 32V554, \$29.95; 32V555, \$29.95; 32V556, \$29.95; 32V557, \$29.95; 32V558, \$29.95; 32V559, \$29.95; 32V560, \$29.95; 32V561, \$29.95; 32V562, \$29.95; 32V563, \$29.95; 32V564, \$29.95; 32V565, \$29.95; 32V566, \$29.95; 32V567, \$29.95; 32V568, \$29.95; 32V569, \$29.95; 32V570, \$29.95; 32V571, \$29.95; 32V572, \$29.95; 32V573, \$29.95; 32V574, \$29.95; 32V575, \$29.95; 32V576, \$29.95; 32V577, \$29.95; 32V578, \$29.95; 32V579, \$29.95; 32V580, \$29.95; 32V581, \$29.95; 32V582, \$29.95; 32V583, \$29.95; 32V584, \$29.95; 32V585, \$29.95; 32V586, \$29.95; 32V587, \$29.95; 32V588, \$29.95; 32V589, \$29.95; 32V590, \$29.95; 32V591, \$29.95; 32V592, \$29.95; 32V593, \$29.95; 32V594, \$29.95; 32V595, \$29.95; 32V596, \$29.95; 32V597, \$29.95; 32V598, \$29.95; 32V599, \$29.95; 32V600, \$29.95; 32V601, \$29.95; 32V602, \$29.95; 32V603, \$29.95; 32V604, \$29.95; 32V605, \$29.95; 32V606, \$29.95; 32V607, \$29.95; 32V608, \$29.95; 32V609, \$29.95; 32V610, \$29.95; 32V611, \$29.95; 32V612, \$29.95; 32V613, \$29.95; 32V614, \$29.95; 32V615, \$29.95; 32V616, \$29.95; 32V617, \$29.95; 32V618, \$29.95; 32V619, \$29.95; 32V620, \$29.95; 32V621, \$29.95; 32V622, \$29.95; 32V623, \$29.95; 32V624, \$29.95; 32V625, \$29.95; 32V626, \$29.95; 32V627, \$29.95; 32V628, \$29.95; 32V629, \$29.95; 32V630, \$29.95; 32V631, \$29.95; 32V632, \$29.95; 32V633, \$29.95; 32V634, \$29.95; 32V635, \$29.95; 32V636, \$29.95; 32V637, \$29.95; 32V638, \$29.95; 32V639, \$29.95; 32V640, \$29.95; 32V641, \$29.95; 32V642, \$29.95; 32V643, \$29.95; 32V644, \$29.95; 32V645, \$29.95; 32V646, \$29.95; 32V647, \$29.95; 32V648, \$29.95; 32V649, \$29.95; 32V650, \$29.95; 32V651, \$29.95; 32V652, \$29.95; 32V653, \$29.95; 32V654, \$29.95; 32V655, \$29.95; 32V656, \$29.95; 32V657, \$29.95; 32V658, \$29.

Designed for Application



90672

The No. 90672 ANTENNA BRIDGE

The Millen 90672 Antenna Bridge is an accurate and sensitive bridge for measuring impedances in the range of 5 to 500 ohms at radio frequencies up to 200 mc. It is entirely different in basic design from previous devices offered for this type service inasmuch as it employs no variable resistors of any sort. The variable element is an especially designed differential variable capacitor capable of high accuracy and permanency of calibration over a wide range of frequencies. A grid dip meter such as the Millen 9065 may be used as the source of RF signal. The bridge may be used to measure antenna resistance, transmission line impedance, standing wave ratio, receiver input impedance and many other radio frequency impedances. By means of the antenna bridge, an antenna matching unit may be adjusted so as to provide the minimum standing wave ratio on the radiation system at all frequencies.

**JAMES MILLEN
MFG. CO., INC.**

MAIN OFFICE AND FACTORY

MALDEN
MASSACHUSETTS



Index of Advertisers

Adirondack Radio Supply	104
Allied Radio Corp.	152
Alltronics	134
American Electronics Co.	120
American Radio Association	140
American Radio Relay League, Inc.	
<i>Mobile Manual</i>	114
<i>QST</i>	118
<i>QST Binders</i>	142
<i>QST Handbook</i>	144
Arrow Electronics, Inc.	146
Ashe Radio Co., Walter	100
Barker & Williamson Inc.	121
Belden Mfg. Co.	4
Biley Mfg. Co.	97
Burkhardt Radio Supply, Inc.	105
Burstein-Applebee Co.	123
Candler System Co.	140
Central Electronics, Inc.	136
Centralab	93
Clegg Radio Supply Co.	102
Collins Radio Co.	98, 118
Columbia Products Co.	2
Communication Products Co.	128
Crawford Radio	78, 79
CrystaL Incorporated	144
Curie Radio Supply	130
Dale Electronics, Vaaro Div.	108
Dow-Key Co., Inc., The	122
Dixerama	112
Editors and Engineers, Ltd.	141
Etel-McCullough, Inc.	31
Extron Electronics, Inc.	11
Engineering Associates	138
Equipment Crafters, Inc.	90
Evans Radio	132
E-Z Way Towers, Inc.	126
For Orange Radio Distributing Co., Inc.	115
Freud Transistor Co., Inc.	132
Gardine & Co.	138
General Electric Co.	1
Gonset Co.	87
Gotham Hobby Corp.	95
Greener, Tom, Jr.	100
Hammaffair Co.	7, 71
Hammarlund Mfg. Co., Inc.	83
Harristahl Laboratories	130
Hart Industries	138
Harvey Radio Co., Inc.	107
Harvey-Wells Electronics, Inc.	141
Hefner Co.	76, 77
Henry Radio Stores	113
Hughes Research & Development Labs	111
Illumitronic Engineering	145
Institute of Radio Engineers	137
Instructograph Co.	145
International General Mfg. Co., Inc.	89
International Instruments Inc.	144
Johnson Co., E. F.	72, 73
Lafayette Radio	131
Lampkin Laboratories, Inc.	112
Letterman Radio Mfg. Co.	136
L.M.R.	110
L.W. Electronic Laboratory	145
Mallory & Co., Inc., P. R.	85
Mass. Radio & Telegraph School	140
Master Mechanic Mfg. Co.	137
McGraw-Hill Book Co.	103
Millen Mfg. Co., Inc., Jamaica	150
Morrow Radio Mfg. Co.	106
Mosley Electronics, Inc.	88, 124
National Co., Inc.	Cov. III
Newark Electric Co.	110
Omega Mfg. Co.	101
Pan Communications Engineers, Inc.	140
Penta Laboratories, Inc.	94
Petersen Radio Co.	5
P & H Electronics	142
Philco TechRep Div.	127
Poly Antenna Bridge	20
Radio Corp. of America	Cov. IV
Radio Publications, Inc.	133
Radio Shack Corp.	129
Radio Specialties, Inc.	91
RCA Institutes, Inc.	144
RCA Laboratories	138
Rider Publisher, Inc., John F.	134, 144
Selectronic Supplies, Inc.	126
Sonar Radio Corp.	122
Sun Parts Distributors, Ltd.	143
Technical Material Corp.	74, 75, 151
Tele-Vue Towers, Inc.	134
Teleplex Corp.	142
Telrex, Inc.	99
Tennalab	114
Terminal Radio Corp.	119
Triad Transistor Corp.	122
Ultra Modulated Corp.	128
Valley Electronic Supply Co.	123
Valparaiso Technical Institute	136
Vesto Co., Inc.	124
Wibroplex Co., Inc.	136
Wardenclyffe Corp.	106
Western Gear Corp.	139
Western Electric Co.	116
Wiens Electronics Laboratories	145
World Radio Laboratories, Inc.	109, 117
YMCA Trade & Technical School of N. Y.	132

... still more about the all new



Having told you how good
the Receiver is, we now feel
we have enough receivers
in the field to detail
all our complaints
to date and give you
the answers . . .



<u>Trouble</u>	<u>No. of Comp.</u>	<u>Explanations and Remedy</u>
High Hum Level	(1)	Replace defective 6V6 tube.
Birdies in BC band	(1)	Replace defective 6CB6 tube.
Birdies in all bands	(1)	Set located $\frac{1}{2}$ block from 50 KW FM station. Remedy: Trap out FM station or move.
Calibration	(2)	Set was zero with WWV at one end and $\frac{1}{2}$ division out at the other end (possible in general coverage receivers). Error, etc. is less than 0.01%. Remedy: Circuit for xtal calibrator sent.
Drift, HFO	(1)	Cold start error. All precision VFO instruments drift but will stabilize in about 20 minutes to 1 hour. Remedy: We replace the receiver and the customer is happy.
Noise Limiter	(1)	Set located where no limiter would eliminate all the noise (10 meters operated at base of heavily travelled avenue). Can't lick 'em all—We took it back.
Set Inoperative	(1)	Phono-Radio Switch in rear in "phono" position. Surprise!!!
Scratched Cabinet	(1)	Packer with heavy stapler hand and light heart. Remedy: Scratch one packer to large broom dept.
S-meter	(1)	Meter Reading not as great as on "X" receiver—We calibrate S-9 at 50 Microvolts. We could make it S-9 at 10 Microvolts. What'll you have?
Audio Spread	(1)	It didn't work. Remedy: Read instruction book. Customer now very happy, (another one).



These are all the problems received to date—more later if we get any. Well, as far as we know, everyone is happy with the GPR-90 and if you are skeptical just listen to the chatter on the ham bands.

We must apologize for being totally unprepared for the rush of orders for the GPR-90, but deliveries are presently being made to the dealer within 30 days.

THE TECHNICAL MATERIEL CORPORATION

IN CANADA: TMC CANADA, LTD.
OTTAWA, ONTARIO

MAMARONECK, N. Y.

Save Money

BUILD YOUR OWN
ENGINEERED-QUALITY

Ham Gear



Model SX-255

\$42.50

Built-in Pi-Type Antenna Coupler

Check the features packed into this new transmitter kit and you'll see why it's one of the greatest Amateur values ever offered. Compact and versatile, it is the perfect low-power rig for the beginning Novice or seasoned veteran. Features: 50 watts input to 807 final; high-efficiency 6AG7 modified-Pierce oscillator takes crystal or VFO without circuit changes; bandswitching coverage of 80, 40, 20, 15, 11-10 meters; pi-section antenna output matches line impedances from 50 to 1200

get top dollar value in
ALLIED knight-kits
They're better by far...

BUY DIRECT AND SAVE: Knight-Kits give you the last word in Amateur design and value. They're easy to build from crystal-clear manuals, and the performance is unequalled. Save money—buy direct—get top quality with these Knight-Kits.

LOW COST knight-kit 50 WATT CW TRANSMITTER KIT

- Pi-Type Antenna Matching
- Bandswitching
- For 80 Through 10 Meters
- TVI Suppression

ohms—permits use with any type of antenna. Crisp, clean, cathode keying of oscillator and final. Power take-off plug supplies filament and B-plus voltages for other equipment. Copper-finished chassis and cabinet interior, filtering, shielding, bypassing, and coaxial SO-239 antenna connector provide excellent TVI suppression. Meter reads either plate or grid current of final. Jacks for VFO, crystal, and key. Supplied with all parts, tubes and step-by-step instructions. Less crystal and key. Size, $8\frac{1}{4} \times 11\frac{1}{8} \times 8\frac{3}{4}$. For 110-120 volts, 50-60 cycle AC. Shpg. wt., 18 lbs. **\$42.50**

SX-255. 50-Watt Transmitter Kit. Net. \$42.50



knight-kit
SELF-POWERED
VFO KIT

Model S-725

\$27.50

Complete with built-in power supply! Careful design and voltage regulation assure high stability. Excellent oscillator keying characteristic for fast break-in with clicks or chirps negligible. Full TVI suppression. Has plenty of bandspread: separate calibrated scales for 80, 40, 20, 15, 11 and 10 meters; vernier drive mechanism, 2-chassis construction keeps heat from frequency determining circuits. Output cable plugs into crystal socket of transmitter. Output on 80 and 40 meters. With Spot-Off-Transmit switch for "no swish" tuning. Extra switch contacts for operating relays and other equipment. Complete kit for easy assembly. Shpg. wt., 8 lbs.

Model S-725. Self-Powered VFO Kit. Net. \$27.50



knight-kit
CODE PRACTICE
OSCILLATOR KIT

Model S-239

\$4.95

Transistorized—
Powered by Flash-
light Battery

An ideal new code practice oscillator. Uses transistor circuit. Extremely low current consumption—powered by single penlight battery. Provides crisp, clear tone (400 to 600 cps). Has input jack for earphone; screw-type terminal strip for key. In compact bakelite case ($2\frac{1}{2} \times 3\frac{1}{4} \times 1\frac{1}{2}$) with anodized aluminum panel. Complete with all parts, battery and easy-to-follow instructions. Shpg. wt., 1 lb.

Model S-239. Code Practice Oscillator Kit. \$4.95



SEE YOUR 324-PAGE ALLIED CATALOG

It's packed with dozens of other Knight-Kit values and the largest selections of station gear—your complete buying guide to everything in Electronics. If you haven't a copy, write for it today.

ALLIED RADIO

100 N. Western Ave., Dept. 15-B-6
Chicago 80, Illinois

GET EVERY BUYING ADVANTAGE AT ALLIED

Highest Trades. Tell us what you've got and what you want—we'll go all-out to give you the top-dollar trade.

Top Buys in Reconditioned Gear. Send for our lists of big values in high quality reconditioned receivers, transmitters, mobile gear, etc. We've been trading high and wide and that means we've got top reconditioned buys for you.

Easy Terms. Only 10% down on orders totaling \$45 or more—and the easiest pay terms anywhere.

world famous for quality dependability and value

... National Receivers set the standard for the industry—
with a complete line for novice, SWL or old timer



NC-300

The NC-300 incorporates all the features most hams want . . . at a price most hams are willing to pay! It features a sensitivity of 3-6 db noise figure on all amateur bands. Warm-up drift less than .01%. It has the longest slide rule dial ever . . . with 10 dial scales for coverage of 160 to 1 1/4 meters with National's exclusive new converter provision for 6, 2, 1 1/4 meters. These are only a few of the highlights!



HRO-60

Latest and greatest of a great series! Frequency range: 1.7 to 30 mcs . . . additional coils available from 50 kc to 35 mcs. Gives you dual conversion on all frequencies above 7 mcs plus 12 permeability-tuned circuits in the three 456-kcs IF stages. Has current-regulated heaters in the high-frequency oscillator and the 6BE6 mixer. High-frequency oscillator and 8-meter amplifier are voltage regulated.



NC-183D

Has dual conversion above 4.4 mcs . . . steep-sided skirt selectivity with 3 IF stages (16 tuned circuits on the 3 high bands—12 on all other bands) plus a new crystal filter. Approximately 1 microvolt sensitivity on 6 meters for a 10db signal-to-noise ratio! Frequency range: .54 mcs to 31 mcs plus 47-55 mcs.



NC-88

Compare these features! Calibrated bandspread for 80, 40, 20, 15, 11 and 10 meter bands . . . advanced A. C. superhet circuit uses 8 high gain miniature tubes plus rectifier . . . covers 540 kcs to 40 mcs in 4 bands . . . tuned RF stage . . . two IF stages . . . 2 audio stages with phone input and two position tone control . . . built-in speaker . . . antenna trimmer . . . separate high frequency oscillator . . . sensitivity control . . . series valve noise limiter . . . delayed A. V. C. . . headphone jack . . . standby-receive switch.



NC-98

The lowest priced receiver with a crystal filter, the NC-98 has calibrated bandspread for 80, 40, 20, 15, 11 and 10 meter bands . . . advanced A. C. superhet circuit uses 8 high gain miniature tubes plus rectifier . . . covers 540 kcs to 40 mcs in 4 bands . . . tuned RF stage . . . two IF stages and 2 audio stages with phone input and two position tone control. ALSO, antenna trimmer, separate high frequency oscillator, sensitivity control, series valve noise limiter, delayed A. V. C., headphone jack, standby-receive switch. Available with a calibrated bandspread scale for the SWL bands.



NC-125

Frequency range: .56 to 35 mcs. Has built-in SELECT-O-JECT audio filter. Average sensitivity 3 microvolts for 10 db signal to noise ratio. Has AVC, noise limiter, voltage regulated stabilized oscillator. Audio system essentially flat to 10,000 cps. Provision for NFM Adaptor.

SW-54



The most astonishing little receiver on the market today! Covers broadcast and 3 shortwave bands—540 kcs to 30 mcs. Receives voice or code. Police, ship, amateur, foreign stations clearly marked. Uses new miniature tubes for improved sensitivity. Easy-to-read indirectly lighted scale. Accurate "logging scale" also provided. Provision for headphones. Send-Receive switch for "ham" use with transmitter. Measures only 11" x 7". AC-DC operation.

Write for National's New Receiver Catalog

tuned to tomorrow

National

NC

NATIONAL COMPANY, INC.
62 SHERMAN STREET, MALDEN 48, MASSACHUSETTS

RCA POWER TUBES

CLASS C POWER AMPLIFIERS AND OSCILLATORS

RCA Type	Class of Service	Max. Plate Ratings		Max. Frequency for full Input Mc	Heater (H) or Filament Volts	Typical Operating Conditions							
		DC Input Watts	DC Volts			DC Plate Volts	DC Grid-No. 3 Volts	DC Grid-No. 2 Volts	DC Grid-No. 1 Volts	DC Plate Current Ma.	Approx. Driving Power Watts	Approx. Power Output Watts	
TRIODES													
811-A	CW Phone	260	1500	65	30	6.3	1500	—	—	-70	173	7.1	200
		175	1250	45						-120	140	10	135
812-A	CW Phone	260	1500	65	30	6.3	1500	—	—	-120	173	6.5	190
		175	1250	45						-115	140	7.6	130
8005	CW Phone	300	2500	85	60	10	1500	—	—	-130	200	7.5	220
		240	1250	75						-195	190	9.0	170
8000	CW Phone	750	2500	175	30	10	2500	—	—	-240	300	18	575
		500	2000	125						-370	250	20	380
833-A	CW Phone	1000	3300	350	30	10	3000	—	—	-160	335	20	800
		1000	3000	250						-240	335	26	800

BEAM POWER TUBES AND PENTODES

5618	CW	7.5	300	5	100	3.0	300	0	75	-45	25	0.2	5.4	
	CW Phone	17	350	13.5	50	6.0 (H)	350	0	250	-28.5	48.5	0.1	12	
5763														
	CW Phone	15	300	12			300	0	250	-42.5	50	0.15	10	
6417	Same as 5763 except for 12.6-volt heater													
2E24	CW Phone	40	600	13.5	9	125	6.3	600	—	195	-50	66	0.21	27
		27	500	9			500		180	-45	54	0.16	18	
2E26	CW Phone	40	600	13.5	9	125	6.3 (H)	600	—	185	-45	66	0.17	27
		27	500	9			500		180	-50	54	0.15	18	
832-A	CW Phone	50	750	20	200	6.3 (H)	750	—	200	-50	65	0.24	35	
		36	600	15			600		200	-70	60	0.21	26	
807	CW Phone	75	750	30	60	6.3 (H)	750	—	250	-45	100	0.3	54	
		60	600	25			600		300	-85	100	0.4	44	
6524	CW Phone	85	600	25	100	6.3 (H)	600	—	200	-44	120	0.2	56	
		55	500	16.7			500		200	-61	100	0.2	40	
6146	CW Phone	90	750	25	60	6.3 (H)	750	—	160	-62	120	0.2	70	
		67.5	600	16.7			600		150	-87	112	0.4	52	
4X150A	CW Phone	250	1250	150	500	6.0 (H)	1250	—	250	-90	200	1.2	195	
		200	1000	100			1000		250	-105	200	2	140	
829-B	CW Phone	120	750	40	200	6.3 (H)	750	—	200	-50	160	0.4	90	
		90	600	28			600		200	-60	150	0.5	70	
5894	CW Phone	120	600	40	250	6.3 (H)	600	—	250	-80	200	4	85	
		72	450	27			450		250	-100	150	0.6	50	
4-65A	CW Phone	345	3000	65	50	6.0	3000	—	250	-100	115	1.7	280	
		275	2500	45			2500		250	-135	110	2.6	230	
4-123A	CW Phone	500	3000	125	120	5.0	3000	—	350	-150	167	2.5	375	
		380	2500	85			2500		350	-210	112	3.3	300	
813	CW Phone	500	2250	125	30	10	2250	0	400	-155	220	4	375	
		400	2000	100			2000	0	400	-175	200	4.3	300	
4-250A	CW Phone	1000	4000	250	110	5	4000	—	500	-225	312	2.46	1000	
3D23	CW Phone	675	3200	165			3000	—	400	-310	225	3.2	510	

MODULATORS OR RF LINEAR AMPLIFIERS (SINGLE-SIDEBAND)

RCA Type	Class of Service	Max. Plate Ratings		Typical Operating Conditions (Two Tubes, Except Where Shown)									
		DC Input Watts	DC Plate Volts	DC Grid-No. 1 Volts	Zero-AF Grid-No. 1 to Grid-No. 2 Volts	DC Plate Current Ma.	Max. Signal Lead Ohms	Plate-to-Plate Lead Ohms	Approx. Max. Sig. Driving Power Watts	Approx. Max. Sig. Power Output Watts			
829-B													
8224	AB ₂	750	100	600	200	-18	36	40	110	13750	0	44	
	AB ₂	500	37.5	500	125	-15	82	20	150	9000	0.46	54	
8226	AB ₂	500	37.5	500	125	-15	60	22	150	8000	0.36	54	
6524	AB ₂	600	85	600	200	-26	76	21	135	11400	0.1	57	
4X150A	AB ₂	1250	300	1250	300	-44	100	180	475	5600	0.15	425	
807	AB ₂	750	90	750	300	-35	96	39	240	7200	0.2	120	
	BA	750	90	750	0	0	555	13	240	6650	5.3	120	
6146	AB ₂	750	90	750	165	-46	108	22	240	7400	0.04	131	
5894	B*	600	120	600	250	-25	53	35	168	8000	0.2	70	
811-A	B	1500	235	1500	—	-4.5	170	32	313	12400	4.4	340	
813	AB ₂	2500	450	2500	750	-95	180	50	290	19000	0	490	
810	B ¹⁰	2750	510	2250	—	-60	380	70	450	11600	13	725	
8000	B ¹⁰	2750	510	2250	—	-130	560	65	450	12000	7.9	725	

Values shown are for Intermittent Commercial and Amateur Service (ICAS), unless otherwise indicated.

¹ High-Pervance Type

² Values are for both units.

³ For beam power tubes and pentodes the values shown are for one factor. Grid No. 2 to Grid No. 1.

⁴ Recommended for RF applications because of low output capacitance.

⁵ Values shown are for Continuous Commercial Service (CCS).

⁶ All ratings are Absolute Maximum values.

⁷ Grid No. 3 connected to center tap of filament supply.

⁸ Audio driving signal fed to Grid No. 2; Grid No. 1 tied to Grid No. 2 through 20,000-ohm, 2-watt resistor.

for every
transmitter
need...

This chart has been prepared expressly for radio amateurs to show operating conditions and maximum ratings on RCA's wide line of power tubes for amateur transmitter application. High-pervance design on many of these types enables you to get the power you want at lower plate voltages. Conservative ratings assure you long hours of reliable operation.

Whether you are planning high power or low power, CW or 'phone, AM or SSB—you can rely with confidence on RCA Power Tubes. Your RCA Tube Distributor handles the entire line. For additional tube data, write RCA, Commercial Engineering, Section B37M Harrison, N.J.



TUBES for AMATEURS

RADIO CORPORATION OF AMERICA